200859

ARCHIVES

OF

OTOLOGY

EDITED IN ENGLISH AND GERMAN

BY

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VOLUME XII.

NEW YORK
G. P. PUTNAM'S SONS, 27 & 29 WEST 23D STREET
LONDON: 25 HENRIETTA STREET, COVENT GARDEN.
WIESBADEN: J. F. BERGMANN'S Verlag
PARIS: J. B. BAILLIERE, 19 Rue Hautefeuille
1883

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G. P. PUTNAM'S SONS
1883

Press of
G. P. Putnam's Sons
New York

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CONTENTS OF VOLUME XII.

NUMBER I.

1. Disease of the Ear Occurring During the Course of Parotitis. By D. B. St. John Roosa, M.D. 1
2. A Case of Bin-aural Objective Sounds, with Synchronous Movements of the Membrana Tympani and the Palatal Muscles. By Dr. Richard C. Brandeis, New York 14
3. Anatomical Researches on the Deviations of the Nasal Septum. By B. Loewenberg, M.D., Paris, France. (With five wood-engravings.) 22
4. Three Serious Cases of Mastoid Disease, with Remarks. By H. Knapp 44
5. A Case of Abscess of the Mastoid, with Entire Absence of Tenderness, Heat, or Swelling over the Suppurating Part, with a Constant Distant Pain near the Occipital Protuberance; Trephining; Occurrence of Erysipelas During Convalescence; Recovery. By F. Tilden Brown, M.D., New York 56
6. Pedunculated Bony Growth in External Auditory Canal, the Result of Long-continued Suppuration; Removal by Snare; Microscopic Examination. By David C. Cocks, M.D., New York . . . 59
7. The Examination of Ears by Means of the Tuning-Fork. By J. B. Emerson, M.D., New York 63
8. Two Cases of Syphilitic Disease of the Labyrinth, with Remarks. By David Webster, M.D., New York 76
9. A Case of Clonic Spasm of the Levatores Palati, Producing a Rhythmical Clicking Noise. By Dr. Cornelius Williams, of St. Paul, Minn. 83
10. The New York Institution for the Improved Instruction of Deaf-Mutes. By D. Greenberger, Principal. (With three drawings.) . 87
11. Die Taubstummen und die Taubstummenanstalten nach seinen Untersuchungen in den Instituten des Königreichs Würtemberg und des Grossherzogthums Baden (Deaf-Mutes and Deaf-Mute Institutions). Von Medicinalrath Dr. Hedinger. Reviewed by A. Hartmann 96

12. Lehrbuch der Ohrenheilkunde für practische Aerzte und Studirende. (Text-Book of Otology, for Practitioners and Students.) By Prof. Adam Politzer. In two volumes. Vol. II. (With 152 wood-engravings.) Reviewed by A. Hartman 99

NUMBER 2.

1. The Effects of Noise upon Diseased and Healthy Ears. By D. B. St. John Roosa, M.D. 103
2. Calcium Sulphide in Aural Diseases. By Gorham Bacon, M.D. . 122
3. Cholesteatoma of the Mastoid Process with Rupture into the External Auditory Meatus after Use of Irish-Roman Baths. By S. Moos, of Heidelberg. Translated by Porter Farley, M.D., of Rochester, N. Y. 129
4. Necrotic Exfoliation of the Superior (?) Bony Semicircular Canal, Preceded by a Week of Dizziness and Vomiting; Recovery with Loss of such Degree of Hearing as had Previously Existed. By S. Moos. Translated by Porter Farley, M.D., Rochester, N. Y. 132
5. Pyæmic Attacks During and After Recovery from an Acute Purulent Inflammation of the Tympanum. By S. Moos. Translated by Porter Farley, M.D. 136
6. Œdema in the Temporal and Zygomatic Regions, as a Symptom of Phlebitis and Thrombosis of the Lateral Sinus. By S. Moos. Translated by Porter Farley, M.D. 141
7. On the Production of Artificial Deafness, and its Bearing on the Etiology and Evolution of the Diseases of the Ear. By Dr. Cassells, Glasgow 147
8. Unsuccessful Attempt at Restoring an Ear-Canal Closed by Cauterization with Sulphuric Acid. By H. Knapp 154
9. Report on the Progress of Otology in the Second Half of the Year 1882. Translated by J. A. Spalding, M.D., Portland, Me. . 157
   I.—Normal and Pathological Anatomy and Histology of the Ear. By Dr. Steinbrügge, Heidelberg.
   II.—Pathology and Therapeutics of the Ear. By A. Hartmann, Berlin.
10. Abstracts from the Otological Papers Read Before the American Medical Association, at its Meeting in Cleveland, O., June 5, 6, and 7, 1883 183
11. Miscellaneous Notes 184

NUMBERS 3 AND 4.

1. The Hyphomycetes Aspergillus Flavus, Niger, and Fumigatus; Eurotium Repens (and Aspergillus Glaucus), and their Relations to Otomycosis Aspergillina. By Dr. F. Siebenmann, of Brugg, Switzerland. Translated by J. A. Spalding, M.D., Portland, Me. 185

2. Reproduction of the Membrana Tympani by Skin-Grafting. By C. W. Tangeman 228
3. Clinical Notes on Ear-Disease: Œdema of the Drum Membrane Simulating Polypus; Deafness Improved by Electricity and Phosphorus. By P. McBride, M.D., F.R.S.E., F.R.C.P., Edinburgh 231
4. The Etiology and Symptomatology of Autophony. By G. Brunner, M. D., Zurich. Translated by H. Knapp 238
5. The Histological Condition of Six Temporal Bones Taken from Three Children who had Died from Diphtheria. By S. Moos and H. Steinbrügge, Heidelberg. Translated by Charles J. Kipp, M.D. 255
6. On the Influence which the Treatment of One Ear Alone Exerts upon the Other. By Dr. A. Eitelberg, of Vienna. Translated by J. A. Spalding, M.D., Portland, Maine 266
7. The Influence of Hearing-Exercises on the Sense of Audition of the Practised and Consecutively on the Other not Practised Ear. By Dr. A. Eitelberg. Translated by Dr. J. A. Spalding . . 279
8. Further Investigations on the Physiological Significance of the Trigeminus and Sympathetic Nerves for the Ear. By E. Berthold, Königsberg, Prussia. Translated by Dr. F. E. D'Oench, New York 292
9. Secondary Symptoms in the Labyrinth as Sequels of Chronic Purulent Inflammation of the Middle Ear. By S. Moos and H. Steinbrügge, of Heidelberg. Translated by H. Knapp 299
10. Histological Labyrinthine Changes in a Case of Acquired Deaf-Mutism. By S. Moos and H. Steinbrügge. Translated by H. Knapp. (With a wood-cut.) 304
11. Neuropathological Communications. By S. Moos. Translated by H. Knapp 309
12. The Diagnosis and Treatment of Diseases of the Ear. By Owen D. Pomeroy, M.D. Reviewed by Swan M. Burnett 323
13. Report on the Progress of Otology During the First Half of the Year 1883. Translated by Drs. J. A. Andrews, New York, and Swan M. Burnett, Washington 325

I.—Normal and Pathological Anatomy and Histology of the Ear. By H. Steinbrügge, Heidelberg.
II.—Physiology and Physiological Acoustics. By Oscar Wolf, Frankfurt.
III.—Pathology and Therapeutics. By A. Hartmann, Berlin.

14. Index 365

ARCHIVES OF OTOLOGY.

DISEASE OF THE EAR OCCURRING DURING THE COURSE OF PAROTITIS.

By D. B. St. JOHN ROOSA, M.D.

THE interest lately shown in the discussion of deafness following mumps, warrants further publication upon this subjeet, especially if there are new cases to be presented. Inasmuch as I have recently had an opportunity of studying and tracing one of these cases more thoroughly than has ever before been my fortune, and since two of them, published in 1874,[1] have escaped the observation of some of the recent writers upon this subject, I have endeavored to gather together, in the following paper, what knowledge I have been able to get in my private practice from a study of disease of the ear occurring during the course of parotitis. The specialists, both in our country and in Germany, have seen but few of these cases. It is possible that general practitioners have seen more of them, but the facts to substantiate such a supposition have not appeared. It is much to be desired that any unpublished experience of this kind should be made generally accessible. I am emboldened to present in this paper all the cases that I have seen, of which I have notes, even though some of them have been printed before, from reading an article by Dr. Brunner, of Zurich, lately published in these ARCHIVES. Dr. Brunner says[2]: "If Roosa has actually seen as many of the cases of deafness after mumps, as he says in the discussion of Buck's two cases, I am very sorry that he has not

[1] *American Journal of the Medical Sciences*, vol. lxviii, page 389.

[2] Vol. xi, page 102.

given us any more exact communications with regard to them."

Dr. Brunner is mistaken in supposing that I ever claimed to have seen many cases of impairment of hearing during or after parotitis. Any one who is interested in such a small matter as to what I claimed as to my experience, will find by reference to the dicussion that occurred in the American Otological Society, that this remark of Dr. Brunner's is entirely unjustified.[1]

I think the papers by Buck, Brunner, Moos, and Knapp give the idea, that this subject of deafness after mumps has been greatly neglected by the writers on aural medicine and surgery, including myself. But the text books of Toynbee, Hinton, and Roosa, as well as that of Dalby, really give as much information as that contained in some of the recent papers. The reason for the meagreness of statement is to be found in the fact, that none of us saw these cases, as a rule, until they had run their course. It is only during the last two years, that I have seen a case near enough to its beginning to allow of any accurate study of its etiology. Cases of aural disease after mumps came to us, as do so many cases of deafness after cerebro-spinal meningitis, when all acute symptoms had subsided, and we could only learn of them by hearsay. I am very glad to be able to report an entirely new and acute case in this paper, and one which, in my opinion, is valuable as indicating the causation, treatment, and prognosis.

There has been, I think, no such silence on the part of English writers or myself upon the subject, as one reading recent articles would be led to suppose. Toynbee's reference to the subject, in his work published in 1860,[2] is so complete that the recent German writers have added very little if any thing to it. He states that "the peculiar poison which causes the disease generally known by the name of mumps is *very often* the source of complete deafness, which, however usually occurs in one ear only." In this sentence will be found an epitome of most that has been said of late

[1] These ARCHIVES, vol. x, p. 274.

[2] "Diseases of the Ear," London, page 361.

on this subject, except that *very often* should be stricken out. In the first edition of my work on the ear, I mentioned mumps as a cause of disease of the ear, while in later editions, especially in the one of 1878, I gave a fuller notice of the subject. James Hinton,[1] in his most excellent work, a book that is singularly honest and suggestive, uses the following language, which it seems to me, indicates a comprehensive study of the subject, and adds very much to what Toynbee said twenty-two years ago. "Next, or perhaps equal, in frequency to scarlatina, in this respect, stands mumps, which has an effect on the nervous apparatus of the ear which has as yet received no explanation, and affords no clue to the use of remedies; every part of the ear being normal, so far as examination can extend, but the function is almost abolished. '*But some cases* (the italics are mine) *of damage to the ear from mumps present an intermediate character, showing clear signs of a tympanic disorder mixed with the nervous symptoms. The similarity of the nerve affection that follows mumps to that which ensues upon parturition, is very striking; and the resemblance is increased by the fact that quite frequently the latter affection also is accompanied with symptoms of a catarrhal character.*'" Such a paragraph as this, atones to a great degree for the vagueness complained of in the authors who have spoken of disease of the ear occurring after mumps.

It is to be noticed, however, that Toynbee and Hinton both speak of the affection as if it were a common one. It was this statement of Toynbee, that led me to lay no especial stress upon my first cases—for I supposed I was alone among otologists in having seen but few of them—and I published them in an article upon diseases of the internal ear. In the same way, I published a case, in an article upon acoustic neuritis and atrophy of the acoustic nerve, in September, 1881,[2] which I had seen and treated for three weeks. This latter case is one of those presented by Dr. Buck, at the meeting of the American Otological Society, a case which he saw after he had been under the care of

[1] "The Questions of Aural Surgery." Henry J. King & Co., London, 1874.

[2] These ARCHIVES, vol. x, p.

Dr. Ely and myself. I have notes of ten cases of disease of the ear occurring during parotitis, out of a total number of more than 4500 cases of aural disease that I have seen in private practice, and of which I have taken notes.

CASE 1.—*Parotitis. Deafness of one side. Patient first seen three years after the occurrence of the mumps.*

H. A. H., aged twenty-three, student of medicine. Three years ago the patient had a slight attack of the mumps. During it he lost the hearing of the right ear. Hearing distance, R $\frac{\text{mastoid}}{4\,8}$ and L $\frac{4\,8}{4\,8}$. The membrana tympani appears to be normal. There is considerable *tinnitus aurium*. The patient was treated through the Eustachian tube for about two months. The tinnitus was usually diminished for an hour or so after the applications through the catheter.

In this case there was certainly disease of the middle ear. It will be observed that the watch was heard upon the mastoid process, while not upon the meatus. The case was seen in 1866, when I was not aware of the value of the tuning-fork in making a differential diagnosis of disease of the middle ear. Yet, from the results of the treatment, I am confident that there was an affection of the middle ear; as I have said, however, the nerve may have been affected.

CASE 2.—*Disease of labyrinth of one side after parotitis. Patient first seen one year after loss of hearing occurred.*

Miss B., aged twenty-one, June 14, 1871. Patient states that she had the mumps one year ago. After recovery, she observed a buzzing sound like that made by insects. She has not heard from the ear since. At times there is an unpleasant fulness in the ear.

The hearing distance from the right ear is normal. From the left, it is $\frac{0}{4\,8}$.

The membranæ tympani are normal. The tuning-fork is heard only on the right side.

The patient was seen again in September of the same year. She then stated that she had vertigo occasionally. In other respects the condition was the same.

The evidence is clear that the labyrinth was the chief, if not the only, seat of the aural disease in this case. The foregoing cases are those published in the *American Journal of Medical Sciences, loc. cit.*

CASE 3.—*Disease of labyrinth of both sides after scarlet fever, measles, and mumps. Patient first seen thirty-one years after loss of hearing occurred.*

Henry N. X., aged thirty-four, Sept. 15, 1873. The patient states that when two or three years old he had the measles, scarlet fever, and mumps in one year, and that his hearing has been defective ever since. He never had any discharge from the ears, and he rarely has tinnitus.

H D, R $\frac{0}{48}$ and L $\frac{P}{48}$ (?)

The tuning-fork is heard better on the better side. The right drumhead is somewhat sunken. The left one looks well.

Inflation of the middle ear produces no change in the hearing power.

The meagreness of the history does not enable me to say whether the loss of hearing was observed immediately after the attack of parotitis, or after the measles, or scarlet fever. The absence of ulceration at any time, however, inclines me to believe it to be a true case of loss of hearing as a result of parotitis.

CASE 4.—*Impairment of hearing of left ear, occurring during attack of parotitis. Disease of right ear had occurred previously from scarlet fever. Patient first seen about five months after attack of mumps.*

Mrs. J. S. C., aged about thirty-five, Oct. 1, 1875. The patient states that she had scarlet fever at the age of eighteen. She has suffered from greatly impaired hearing on the right side ever since. Last May she had the "mumps." During the course of the disease, she found that she was deaf in the left ear. She heard well on one day, and the next day she found herself deaf. There was no pain in the ear, and no discharge from it. She has suffered from tennitus aurium since. She hears the watch on the right side (on that of the ear deaf from scarlet fever), $\frac{1}{40}$. L ear when

pressed upon the mastoid, $\frac{m}{40}$. She has naso-pharyngeal catarrh. Both drumheads are of good color, and have good light spots.

The diagnosis made was disease of the middle ear on the right side and disease of the labyrinth on the left. The grounds for the diagnosis of labyrinthine disease are, however, not given, except in the statement that the deafness occurred suddenly, and that inflation caused no improvement in the hearing. Unfortunately, I do not remember the case with enough clearness to give any more detailed account of the reasons for believing that the ear affected by scarlet fever was chiefly so in the middle part, while the other had a lesion of the nerve.

CASE 5.—*Impairment of hearing of one side after mumps. Inspissated cerumen. Hearing improved after its removal. Patient first seen ten years after the parotitis had occurred.*

C. H. T., aged twenty-eight, Oct. 12, 1875. The patient states that he had the mumps ten years ago. After that he observed that the watch was heard better in front of the right ear than of the left. He did not regard the condition of his ear very much until last summer, when he had a sore throat and dyspepsia, when his attention was again called to his ears. He then observed a drumming noise in the left ear, and some impairment of hearing. The hearing distance was found to be R $\frac{40}{40}$, L $\frac{\text{Pressed}}{40}$. The tuning-fork was heard better in the worse ear. The pharynx was granular. The right drumhead was very much sunken, and there were opacities in it. The light spot was of good size. The left membrana tympani was covered by hard wax. When it was removed the drumhead was found to be sunken, and it had no light spot. On removal of the cerumen, the hearing distance arose from $\frac{P}{40}$ to $\frac{6}{48}$, and after inflation to $\frac{14}{48}$.

The history and examintion show that this was a case of disease of the middle ear. It is probable that the hearing power was only slightly impaired, until the attack of inspissated cerumen, which reduced it so much as to call the patient's attention to it. From my data, I believe that the average hearing power of the side affected by the parotitis was $\frac{15}{40}$.

CASE 6.—*Double parotitis followed by absolute deafness. Patient seen thirty-two days after occurrence of deafness.*

Mabel O., aged four and a half, Feb. 26, 1875. The patient had parotitis about thirty-two days ago. She recovered promptly. Five days after began to suffer from impairment of hearing, and in twenty-four hours she became deaf. For two or three days there was some unsteadiness in her walk, also occasional vomiting. The little patient was very weak.

The patient was found to be absolutely deaf. The drumheads were normal in appearance. No improvement resulted from treatment. That this was a case of disease of the labyrinth is indisputable.

CASE 7.—*Sudden deafness of one ear after mumps. Patient seen a year after the disease occurred.*

R. W. H. of Australia, aged twenty-three, May 3, 1880. The patient states, that he became deaf rather suddenly in the left ear, after an attack of mumps about a year ago. He also had a low fever. Just as he was recovering from the mumps he found that he was hard of hearing on the left side. He could hear the ticking of a watch however. He has remained hard of hearing from that time. H D, R $\frac{48}{48}$; L $\frac{0}{48}$. The bone-conduction for tuning-fork C is better than aërial on the left side. Both membranæ tympani are opaque. No improvement to the hearing resulted from inflation.

This is, I think, a clear case of disease of the middle ear after parotitis; that the internal ear may also have been affected, will not be denied. Yet the probabilities are, that the disease was situated exclusively in the middle ear. The tuning-fork test is, I think, very reliable in determining the situation of the lesion, and that certainly positively indicated disease of the middle ear.

CASE 8.—This case has already been published twice: once by Dr. Buck, in the *American Journal of Otology;* and again by myself, in these ARCHIVES. The patient was treated by Dr. Edward T. Ely and myself, for three weeks, before he consulted Dr. Buck. The reader is referred to these ARCHIVES, vol. x, page 217, for a full account of the case.

Parotitis three weeks before. Deafness two weeks since. Dizziness for one week. Dulness of hearing in the right ear also, which soon passed away. Constant tinnitus.

W. D. C., aged forty-one, sent to me by Dr. J. W. S. Gouley, June 25, 1881.

H D, R $\frac{30}{40}$; L $\frac{P}{40}$ (?). The tuning-fork is heard only in the right ear. It is not heard at all by aërial conduction on the left side.

As I said, in discussing this case in the ARCHIVES, although it had become one of the labyrinth on the left side, it may have begun in the middle ear, for on the other side there was a slight affection of the middle ear, which passed away. I see no reason why a slight affection of the middle ear may not have extended and become a serious affection in a part that tolerates only a very slight lesion; certainly the labyrinth is in direct communication by blood-vessels with the tympanic cavity, which, in turn, through the auditory canal and the mastoid process is directly connected with the parotid gland.

CASE 9.—*Parotitis a year before patient was seen by the writer. Hearing was found to be impaired soon after.*

Janet R., aged twelve, sent to me by Dr. J. W. S. Gouley, March 11, 1882. The patient had parotitis on both sides a year ago. She made a slow recovery. Her hearing was found to be impaired soon after, and it has remained so. Her general health is fair.

H D, R $\frac{48}{48}$; L $\frac{2}{48}$. She cannot say in which ear the vibrating tuning-fork is heard, when placed upon the forehead or teeth. In the left or bad ear the bone-conduction is better than the aërial.

The drumheads are slightly sunken and the light spots are small. The hearing is diminished immediately after inflation.

The patient was seen a few times, but as she seemed to be rather worse for treatment of the middle ear, she was dismissed unimproved.

This case seems to me to be a clear one of disease of the middle ear, although I will not undertake to say that there was not also a lesion of the labyrinth. The fact that she

invariably became worse after inflation of the ear inclines me to think so. But the fact that there was still considerable hearing power left in the ear, inclines me to the belief that the affection was primarily in the middle ear.

CASE 10.—*Parotitis on each side. Chill fourth or fifth day after. Great impairment of hearing. Recovery of one side after inflation of the middle ears. Improvement in the other.*

Robert B., aged eight, was brought to me by his mother on April 24, 1882, with the following history: About three weeks before he was attacked with mumps, affecting each side. On the fourth or fifth day after the mumps appeared, he had chilly sensations one evening, probably in consequence of the lowering of the temperature of the room in which he was. The next day he had a high fever; he vomited; and on that day it was observed that he did not hear well. His hearing has not become worse since, perhaps he is slightly better. He was treated by his attending physician by being kept warm, and injections of a warm solution of chlorate of potash were daily made to his throat. He did not improve much, however. On examination it is found that he hears loud conversation four feet behind his back. Watch, R $\frac{L}{48}$; L $\frac{1}{48}$.

The tuning-fork is heard much better through the bones than through the air, on each side.

The right membrana tympani is of good color. There is a well-formed light spot, and it is not sunken. In the left membrana the light spot is small.

On inflation of the middle ear by Politzer's method, the hearing distance for the watch becomes $\frac{1}{48}$ on the right side and $\frac{10}{48}$ on the left, while the voice is now heard 30 feet.

The patient remained under observation until June. He was treated by the use of Politzer's method of inflation, by syringing the naso-pharyngeal space with a solution of chlorate of potash; and he took cod-liver oil. He then went abroad with his parents. He was directed to continue the treatment, according to circumstances, during the summer. When he returned in October he could hear general conversation with ease, but on the right side the watch was only heard when laid upon the ear, and on the left side for 8 inches. R $\frac{L}{48}$, L $\frac{8}{48}$. Voice 30′. About a month afterward, while under treatment, after the escape of quite an amount

of dark-colored viscid material from his nostrils, the patient said that sounds were unusually loud. On examination the next day it was found that the hearing distance of the right ear was $\frac{5}{48}$, and the left $\frac{30}{48}$. After inflation the hearing distance of the left ear became normal, while the right remained unchanged. At the present time, the patient has passed through an attack of inflammation of the auditory canal and tympanic cavity from exposure to cold, but his hearing has become normal on the left side, while it remains impaired on the right. Feb. 9. R $\frac{12}{48}$, L $\frac{48}{48}$. Voice on right side with normal ear closed, 20 feet. The patient is still under treatment.

This case of impairment of hearing after mumps is a very plain one. It is undoubtedly a case of disease of the middle ear, and not of the nerve. The tuning-fork and the results of treatment indicate this. Yet he had symptoms that are sometimes associated with an affection of the labyrinth. It is quite possible that such an affection might have occurred in the course of any acute disease, if the patient were exposed to a chilling of the body. I am confident, however, that if all the cases of impaired hearing occurring after mumps were observed by an otologist as early as this one was, that a similar process would sometimes be found. Most of the cases seen by an aurist are only seen some time after their occurrence, when the history is very vague. The chief symptom is said to be sudden deafness. In this case the deafness was sudden. Had not inflation come to its relief, within a few weeks, this might have been called a metastatic case ; and I believe the labyrinth might have been invaded by the extension of the inflammatory process through the fenestræ. I see no reason as yet to change the opinion expressed in my text-book,[1] and in my article, from which I have quoted, that in some cases the occurrence of inflammation of the ear after mumps is by direct extension of the inflammation to the auditory canal, middle ear, and labyrinth. That there may be a form of so-called metastatic inflammation, I do not deny. Whether the channel of communication is through the blood, cannot as yet be determined. To my mind the probabilities lie in that direction.

[1] Text-book, 4th edition, 1878, p. 539.

The theory of a metastatic inflammation in these cases, is usually not based upon a study of the symptoms at the time they occurred, but upon reasoning from analogy; *i. e.*, it is said, because the testes and breasts are sometimes affected by metastatic inflammation, therefore a disease of the ear, occurring after mumps, is also a metastatic affection. Hinton, as is seen by the quotation, thought a catarrhal inflammation of the middle ear one of the causes, in some cases at least, of the impairment of hearing *often* seen after mumps. As I have shown, my last case was certainly of this character.

Every one admits that cases of extension of suppurative inflammation of the parotid gland to the external auditory canal, are not uncommon. Probably this extension may take place through the fissures of Santorini. If a suppuration may extend in this way, why not a catarrhal process? We are not without examples of the extension of an inflammation to the middle ear from the auditory canal and outer layer of the drumhead. Every physician at all accustomed to see much of aural disease, has seen cases where from a draught of cold air, the entrance of cold water or irritating substances, an inflammation has been set up in the middle ear by extension, and where the symptoms in the auditory canal have passed away long before those in the middle ear have been relieved. Dr. Brunner's case, is by no means given with minuteness. It is impossible to learn from his account of it, how long after the attack of deafness he saw the patient. Until we have a more full report, it is impossible to say whether or not there was at any time, an inflammation of the middle ear. Certainly, however, there was not at the time the patient was examined by Dr. Brunner.

Dr. Buck's first case was seen still earlier than my last one. On the third day of the mumps the patient had "a sharp pain in the right ear"; on the day following, she discovered that she had lost the hearing of that side; on the seventh or eighth day Dr. Buck saw her. The hearing power seemed to be nearly gone, but the pharynx gave evidence of having been recently inflamed, and the drumhead was "slightly drawn inward." The right Eustachian tube was also

swelled, at least "it was only with difficulty" that air could be forced through it into the middle ear.

Certainly here is evidence enough, that whatever happened to the labyrinth, some morbid process had occurred in the middle ear. I do not know of any natural explanation of such a case, but to say that the inflammation extended by continuity of tissue. If an analysis of the ten cases I now report be made, I think we are justified in assuming:

1. An acute catarrh of the middle ear may occur during the course of mumps, and be attended by fever and vomiting.

2. This catarrh may extend from the parotid gland, through the auditory canal and outer layer of the drum-head, or through the mastoid process.

3. An affection of the labyrinth may occur simultaneously, or by extension from the middle ear.

4. It is probable that there are cases where the disease is transferred to the labyrinth in the same manner that an inflammation sometimes occurs in the testes and the breasts during the course of mumps, but this cannot be considered as proven, until more detailed experience is furnished of cases observed a few hours after the impairment of hearing occurs.

Contrary to the opinion of Toynbee, Hinton, and Dalby,[1] I cannot regard these cases as among those that often occur, for after nearly twenty years of active practice among aural patients, I have notes of but ten cases of disease of the ear after parotitis. There is certainly no comparison in this with what occurs in this country after scarlatina, measles, or typhoid fever. Some inquiry among general practitioners has always shown that it is rarely observed by them. My cases were chiefly from places remote from New York City. Very few are presented at my clinic in the Manhattan Eye and Ear Hospital. During the last year there is a record of but one having been seen there by any of the surgeons out of some twelve hundred cases. My innocent remark at the American Otological Society, that I had seen enough of these cases to make me anxious if any one got a disease of the ear

[1] In a letter just received from Dalby, he says: "I may say that it is within my experience, in a very large number of cases, that the hearing is completely lost during an attack of mumps in one or both ears."

during mumps, was in some manner so distorted, that Brunner was led to believe that I had seen many of them. Those that I have seen convince me that any hope of retaining the hearing power, must depend upon the prompt use of local antiphlogistic means. If the labyrinth be invaded, however, it is doubtful if the cases be not incurable, even if seen at the instant the hearing becomes affected. But what is imperatively needed to clear up the whole subject is the assistance of the general practitioner. If he will call in the otologist so soon as the hearing becomes impaired during an attack of mumps, we may explain some, at least, of the points, that are now doubtful.

A CASE OF BIN-AURAL OBJECTIVE SOUNDS WITH SYNCHRONOUS MOVEMENTS OF THE MEMBRANA TYMPANI AND THE PALATAL MUSCLES.

By Dr. RICHARD C. BRANDEIS, New York.

Bessie K., aged twelve years, came to me in December, 1882, for the relief of persistent noises in both ears, which had troubled her for more than a year past. The child, though sufficiently developed for her years, was pale and anæmic, and wore a peculiarly harassed look, evidently caused by physical disturbances.

On questioning her I found that the noises complained of had set in without any assignable cause, and had never ceased since they were first noticed. They were so loud that they could be heard by any one near her. As she expressed herself, "it feels as if there were a clock ticking inside my head."

Although at first very sceptical as to the truth of her story, I was soon compelled to believe it, because I was able to hear a loud, ticking noise on both sides, at a distance of more than eighteen inches from the head. The noises were uniform in intensity and frequency, as far as I could determine by a cursory examination.

On careful inspection I found the left membrana tympani slightly opaque and somewhat retracted, but not sufficiently so to attract special attention. On the right side the membrane was atrophic and very flaccid and, as I soon found, moved to and fro synchronously with the audible sounds. This movement was especially noticeable at the inferior posterior quadrant of the membrane, but on careful inspection I found that the other portions also participated in the vibrations.

The hearing of the voice and watch was normal on both sides, and the patient stated that audition had never been noticeably impaired.

When I proceeded to inspect the pharynx, I was surprised to find that the soft palate and uvula moved up and down in spite of the most forcible pressure being applied to the tongue by the spatula,—which was sufficient to place the anterior and posterior pillars of the fauces on the greatest tension. The retractions of the velum palati corresponded in frequency and regularity with the tinnitus, and, as I found, were synchronous with the movements of the right drumhead.

On inspection of the neck it was found that the muscular contractions also extended to the digastric muscles on both sides, as well as to the mylo-hyoid and thyro-hyoid muscles, but careful laryngoscopic examination failed to show any movements of the larynx, either as a whole or in part.

The palatal contractions numbered from 120 to 124 to the minute, and occurred in cycles, as follows: there would be a forcible contraction bringing the velum into contact with the posterior wall of the pharynx, and then eight or ten retractions, less intense, but much shorter; then there was again a forcible contraction, and the short and sharp ones would follow in due succession. This never intermitted, but continued as long as the patient was under examination.

By throwing sufficient light into the nasal cavity and dilating the nostrils, I was able to observe the regular synchronous movements of the palate in the posterior nares, and, by listening carefully, satisfied myself that the noises were as intense when heard near the nose as near the ear.

On examining the right membrana tympani, I found that its movements were synchronous with those of the palate, and corresponded also in violence. There was noticed a violent retraction of the entire drumhead, but especially of the inferior posterior quadrant, corresponding with that portion generally occupied by the cone of light, and this was followed by eight or ten vibrations, less marked and intense.

I demonstrated the case to my colleagues, Drs. R. O. Born and F. E. D'Oench, who agreed with me as to the synchronous contractions of the muscles of the palate, and probably of the tensor tympani. The patient was given dilute hydrobromic acid, ten drops of which were to be taken four times a day. The medicine was taken regularly for a week, and at that time I learned that there had been daily intermissions of the tinnitus, varying from one half to two and one half hours. At this visit no evidences of

any movements of the right drumhead could be detected, but the contractions of the palate were as frequent as before. Owing to the anæmic condition of the patient, I now suspended the use of the hydrobromic acid, and administered iron and arsenic instead. On December 11th I saw the patient for the third time, and, noting a return of the movements of the drumhead and an increase in the intensity of the tinnitus, I brought the patient under Prof. Knapp's notice, calling his especial attention to the vibrations of the membrane. When he examined her he failed to observe the phenomenon on which I laid such stress, and I then also satisfied myself that these vibrations were not uninterrupted. Arsenic and iron continued, and Politzer's inflation and suction by means of my modification of Siegle's speculum applied. These were followed by a temporary amelioration of the symptoms, which, however, only lasted one or two days, and when I again saw the patient on the 15th all the phenomena were present. I now introduced Politzer's manometer, a curved tube, one millemetre in diameter, filled with colored fluid, into the right meatus, which was also filled with water, the two columns of fluid being joined by a rubber tube passed over the proximal portion of the manometer, and preventing any ingress of air. Decided fluctuations in the column of fluid contained in the manometer took place, varying in height from one half to one and one half millemetres. This fluid was never raised above the zero mark, but fell from it a variable distance, as noted above, showing that the movements of the drumhead were not positive, but negative ; in other words, there was no protrusion, but a marked retraction of the membrane, varying in frequency from 120 to 126 times in the minute.

In order to determine whether these movements were dependent upon contractions of the tensor tympani muscle, or whether they were due to the alternate compression and escape of the air contained in the Eustachian tube and the tympanic cavity, I applied a thick layer of collodion to the entire surface of the drumhead. As soon as this became adherent and all the ether had evaporated, the membrana tympani was drawn outward and was quite rigid. All movements of the drumhead were suspended, and the noises were as persistent and intense as before, and were audible at twenty-one to twenty-four inches. This proved conclusively that there was no spasm of the tensor tympani which might explain the synchronous in- and excursions. This immobility obtained for more than a week, when the collodion began to flake off, and

as the drumhead was restored to its normal condition, the tinnitus reappeared as of old.

During all this time there was no appreciable change in the frequency or the nature of the contractions of the palatal muscles, and in consequence thereof, I was unable to afford the poor patient any relief from the noises which so sorely distressed her.

I was very anxious to get a rhinoscopic view of the pharyngeal orifices of the Eustachian tube in order to determine the effects which the continuous muscular contractions might have on the lips of the canal. But owing to the uninterrupted movements of the palate, and to the small size of the naso-pharyngeal cavity, I was unable to make an examination. In order to enlarge the cavity by drawing the soft palate forward, I employed Wales' method, which consists in passing a narrow band through one of the nasal passages into the pharynx, then drawing it out through the mouth and tying both ends over the teeth. Passing the narrow tape into the right nasal canal, I succeeded in drawing the right half of the palate forward and introducing a small rhinal mirror. I soon had a view of the corresponding opening of the Eustachian tube ; but owing to the force employed in drawing the palate forward, I overcame the tendency of the muscular contractions, and thus was foiled in my desire to witness the alternate opening and closure of the mouth of the tube. I observed, however, that as long as the traction on the muscles of the soft palate endured, there was a cessation of the noises in the corresponding side of the head. As soon as the tape was slightly loosened, these began to manifest themselves again ; and when the ribbon was entirely removed, they reappeared with their original intensity. During this experiment the left half of the soft palate continued to contract and relax without any diminution in its intensity.

At the next visit which the patient paid me, I introduced two tapes, one into either nasal canal, and tying both of them so tight that the palate was absolutely unable to move, succeeded in causing the noises to disappear entirely for the time being. This was but sorry comfort ; for as soon as the tapes were loosened and withdrawn, the tinnitus reappeared with greater force and frequency than before.

This abnormal behavior of the soft palate, and of the posterior wall of the pharynx, induced me to make an effort to repeat the

experiments of Gentzen,[1] and Falkson,[2] in order to see whether I could obtain any graphic illustrations of the excursions which these parts made. As both these observers experimented upon patients in whom the orbit had been eviscerated, and the orbital walls removed, so as to expose the nasal surface of the palate plainly to view, I was compelled to modify my experiments, as in my case the parts were intact. I made a small lever of cedar wood, 1.5 *mm.* in thickness, 3 *mm.* in width, and 15 *cm.* in length, and wrapped a bit of tin-foil around one end of the strip of wood so as to increase its weight. To the other end of the lever I fastened a small piece of lead pencil. A small hook was fastened into the middle of the lever, and a piece of elastic steel wire attached to it, which was again fastened to a hook in a forehead band, which was passed around the head of the patient. I now introduced the lever into the right nasal canal, in such a manner that the end which was weighted with the tin-foil rested directly on the soft palate. I was, however, disappointed in my hopes in having the lever move synchronously with the soft palate, owing to the small size of the nasal passage, which prevented the lever from moving freely.

Having failed in this endeavor, I made up my mind to have a depiction of the movements of the palate by introducing the lever into the oral cavity and placing it on the velum palati. Taking care that the steel wire was clear of any of the prominences of the face, I was delighted to find that my pencil moved up and down with a freedom equal to the retractions of the palate. I found, however, that the lever was easily displaced from its position as long as it was in contact with the concave surface of the soft palate. This was remedied by grooving the tin-foil transversely, and then passing the posterior ridge behind the free border of the velum palati. When put in this position, the lever was not liable to displacement, and recorded the movements of the palate with great accuracy. The irritability of the soft palate was such, that it was not possible to keep the lever in position for more than a few seconds at a time. The drawings were made on card paper, which was attached to a Marey's sphygmograph, which was placed before the pencil in such a manner that its movements were lightly traced upon the paper.

After the pencil began to trace, five or six sharp curves were

[1] Beobachtungen am weichen Gaumen nach Entfernung einer Geschwulst in der Augenhöhle. Konigsberg, 1876.

[2] Beitrag zur Functionslehre des weichen Gaumens und des Pharynx. *Virchow's Archiv*, vol. lxxix, 1880.

made in rapid succession, followed by a low curve, and again succeeded by a number of sharp, short tracings. These corresponded with the contractions of the velum palati, and with the noises perceived by the patient and observer.

Although cases of objective noises in the ear have been reported by many observers, among them Lucae,[1] Politzer,[2] Delstanche,[3] Johannes Mueller,[4] Küpper,[5] Poorten,[6] Holmes,[7] and S. M. Burnett,[8] the text-books generally give but a meagre account of this condition. In Burnett's treatise on the ear[9] we find a very able and judicious consideration of objective noises in the ear, with a careful analysis of the literature to the time of publication.

The four authors first named above have given instances in which the noises were due to voluntary efforts on the part of the subjects, and were probably produced by a voluntary contraction of the tensor tympani muscles, as suggested by Lucae.

I have a friend, a physician, subject to chronic rhino-pharyngitis who can produce these sounds at will. In his case, however, I am pretty well convinced that the tinnitus is not due to any clonic spasm of any of the intrinsic muscles of the ear, but is owing to forcible contractions of the masseters combined with a gentle friction sound, produced by the movements of the condyle of the lower maxilla in the glenoid fossa. In this case the sounds are distinctly audible at a distance of several inches from the subject.

Cases in which the noises were of an involuntary nature afford more interesting features than those above mentioned, and the explanations given of the causes thereof have been of various nature. For instance, they have been attributed by Müller and others to contractions of the tensor tympani muscle; Wreden has reported a case in which the

[1] *Archiv für Ohrenheilk.*, Bd. iii, p. 201, 1867.
[2] *Ibidem*, Bd. iv, p. 19, 1868.
[3] "Étude sur le Bourdonnement de l'Oreille," Paris. 1872, p. 47.
[4] "Manual of Physiology," Eng. Edit., London, 1838–42 vol. ii, p. 1262.
[5] *Archiv für Ohrenheilk.*, p. 296, 1873.
[6] Poorten: *Monats. für Ohrenh.*, No. 4. 1878.
[7] *Archiv of Otol.*, vol. viii, p. 145, 1879.
[8] *Ibidem*, vol. viii, p. 357.
[9] Philadelphia, 1877, p. 440, *et seq.*

tinnitus was supposed to be due to clonic spasm of the stapedius muscle. Politzer and Luschka have attributed the noises to a spasm of the palatal muscles, by means of which the anterior wall of the orifice of the Eustachian tube is suddenly drawn away from the posterior wall, and the noise is produced by the sudden and forcible contraction of the muscles. I am convinced that this was the cause of the tinnitus in the case which I have just described, in spite of the movements of the membrana tympani. This latter condition might lead one to suppose that there must have been simultaneous or consecutive contractions of the tensor tympani muscle on the right side at least, but I think that this can be disproved by the fact that the tinnitus remained unaffected in spite of the exhaustion of air in the external meatus, by means of my suction syringe. I applied sufficient force to draw the entire drumhead and chain of bones outward, which would have been sufficient to overcome any tendency to contraction, if only while the instrument was applied. These movements of the membrana tympani were probably due to a vacuum in the Eustachian tube and tympanic cavity, caused by the sudden opening of the faucial extremity of the Eustachian tube and the contraction of the muscles of deglutition, which tended to exhaust the air contained in the cavity of the middle ear.

In Küpper's[1] case which was very similar to mine, the spasm of the palate could be controlled by the application of pressure on the base of the tongue and on the minor occipital nerve near the insertion of the sterno-cleido mastoid muscles. I found, however, that when I applied a tongue-depressor the movements of the palate became more rapid, although the excursions were not so great as before; but the contractions of the glossal muscles were somewhat retarded.

The cause of the muscular contractions in my case is difficult to find, the more so as spasms of the muscles of deglutition are very rarely met with; and in spite of a very careful search I have not been able to find any mention thereof in the more recent treatises on diseases of the nervous system.

[1] *Loc. citat.*

After I had had my patient under observation for some time, and finding that there were some symptoms pointing to a tendency to the appearance of the menses, I supposed that she might have an inclination to chorea. I thereupon placed her upon a course of arsenic and iron. This, however, failed to afford any relief, although her general condition improved considerably. Later, I combined this with application of the induced current, both generally and locally, but without any apparent benefit. The patient has recently passed from under observation, but I have no reason to believe that the condition complained of has been ameliorated.

ANATOMICAL RESEARCHES ON THE DEVIATIONS OF THE NASAL SEPTUM.

STUDY OF THE DIFFICULTIES WHICH THEY OCCASION IN OPERATIONS, AND ESPECIALLY IN THE CATHETERIZATION OF THE EUSTACHIAN TUBE; EXPLANATION OF A NEW METHOD FOR OVERCOMING THEM.*

By B. LOEWENBERG, M.D., Paris, France.

(*With five wood-engravings.*)

I HAVE been impressed by the fact that although one may justly be preoccupied by the difficulties of introducing the beak of the catheter into the orifice of the Eustachian tube during catheterization, sufficient account is not taken, in my opinion, of the obstacles which so often interfere with the first act of this operation, that of the passage of the instrument into the nasal fossæ.

It is, however, during this period of catheterization, that the patient is liable to experience the greatest discomfort, because the instrument touches hard parts of bone and cartilage in the nose, contact with which may become extremely painful. What aurist has not seen patients so terrified by the distressing sensations occasioned in the beginning of catheterization that they interrupted the operation and absolutely refused its repetition, thus frequently making all efficacious treatment impossible?

I go so far as to think that the dread inspired in the public by Eustachian catheterization proceeds chiefly from the pain occasioned at the time of the passage of the instrument through the nose. It has, therefore, seemed to me useful

* The practical portion of this work was briefly communicated by the author to the International Congress of London, and published in the transactions of that Congress vol. 3, pp. 432-434. The anatomical researches were made during the winter of 1881-1882. Later articles, such as that of M. Zuckerkandl, not having been at the disposal of the author, could not, therefore, be utilized for this study.

to investigate the causes of this phenomenon more carefully than has been done up to this time, and to find out whether it be possible to avoid the inconveniences to which I have referred.

The following article contains the results of my anatomical and clinical researches on this subject.

My investigations had for their object the solution of the three following problems:

1. What is the seat and the nature of the obstacles which so frequently arrest the catheter during its passage through the nose?

2. What is their rôle in this operation, and in the therapeutics of the nasal fossæ?

3. How can one recognize the existence of these obstacles, and avoid them in a rational and scientific manner?

I.—SEAT AND NATURE OF THE NASAL OBSTACLE IN CASES OF DIFFICULT EUSTACHIAN CATHETERIZATION.

A.—*Clinical investigations.*

Long before undertaking the special researches which form the basis of the present article, I had learned by practice that, in the case in question, the obstacle is seated in the front and lower part of the nasal fossæ. It was, therefore, evidently useless to have recourse to posterior rhinoscopy, which generally only reveals to us the reflection of the back and upper part of the nasal fossæ, foreshortened and from behind.

Facts having proved this to me, I was obliged to use anterior rhinoscopy, the examination of the interior of the nose by the nostrils.

This method demonstrated that *in the numerous cases where the catheter encounters an obstacle in the nasal fossæ, this is not in the turbinated bones, as is often supposed, but in the septum.* A priori, one would be inclined to charge this either to hypertrophy of the lower turbinated bone, which is so common, or to the presence of mucous polypi; but inspection by the method which I shall explain later, shows that the much enlarged mucous membrane of the turbinated bone generally yields enough to a gentle pressure to allow

the passage of the catheter. As for the mucous polypi, they let the beak of the instrument go by, taking their original position again as soon as it is passed.

The obstacle therefore belongs only to the septum; it forms there the protuberances or spurs which I have described in a previous article.[1] I only considered them in that place in regard to their importance in the treatment of chronic coryza by the galvano-cautery, and I merely mentioned there the part they play in the catheterization of the Eustachian tube, giving notice that I should take up the subject in a later publication. The present article is intended to realize the execution of that project.

Having recognized the seat, always identically the same, of these particular deformities of the septum, and the important part they may play in catheterization, of which we shall treat farther on, I was desirous of elucidating the *anatomical pathological-conditions* under which these malformations present themselves. In doing so I was asked to enlarge the field of study, and to consider various other points concerning the nasal septum.

B.—*Anatomical-pathological researches on the deviations of the nasal septum.*

My researches are based, on the one hand, on the dissection of more than one hundred fresh heads; on the other, upon the study of skulls at the Orfila Museum of the Faculty of Medicine, Paris, and especially of the immense anthropological collection at the museum of the Jardin des Plantes. As the cartilaginous framework is more or less completely lacking in dry skulls, I have examined them particularly with regard to the conformation of the vomer and the perpendicular lamella of the ethmoid, while I have studied the cartilaginous septum from life and from fresh heads which I have dissected.

Knowing that the reading of dry columns of figures alarms the most intrepid reader, I refrain from presenting a detailed table of the different categories of my observations, which

[1] B. Loewenberg: Contribution au traitement du coryza chronique simple. In *Union médicale*, 28 Juillet, 1881.

have been made upon hundreds of skulls. I shall confine myself to stating briefly the principal results of these researches.

Superior horizontal deviation of the nasal septum.—It is only in about one case out of seven that I have found a septum absolutely straight in all its parts, consequently in a much smaller proportion than is generally supposed. (See treatises on anatomy.)

In other cases, which constitute, as one may see, the very large majority, one or several deviations exist. According to my investigations, these must be divided into several groups, which I shall call *vertical deviations* and *horizontal deviations*, the latter being divided into *superior and inferior horizontal deviations.*

The superior horizontal deviation pertains to the upper portion of the septum, and particularly to the perpendicular lamella of the ethmoid. Its convexity is oftener in the direction of the right than of the left, in a proportion which I have found to be from about three to five.

Inferior horizontal deviation of the nasal septum.—I call inferior horizontal deviation the lateral deformity of the lower part of the septum. It occurs, as I said in my communication to the London Medical Congress,[1] at the junction of the cartilaginous with the osseous septum; or, to express it more precisely, at the junction of the inferior posterior border of the cartilage of the septum, posteriorly, with the anterior border of the vomer, and, anteriorly, with the ridge that surmounts the line of junction of the palatine apophyses of the superior maxillaries.

It proceeds from the fact that the bony part on the one hand and the cartilaginous part on the other are not in the same vertical plane, but join under a dihedral angle projecting toward one side. When this deviation extends as far as the front extremity of the junction, it forms there the protuberances or spurs which I have described (*loc. cit.*), and which are located in accordance with what I have just said of their origin, in the lower and front part of the nasal

[1] Transactions of the International Medical Congress, London, 1881, vol. iii, p. 432.

fossæ, where this osseous-cartilaginous junction terminates. In cases where these excrescences are unilateral, they exist oftener at the left than at the right, as does the convexity of the lower horizontal deviation, as we shall see later.

I have studied the conformation of the lower deviations, and the protuberances which result from them, from numerous vertical and transverse sections of the septum. They have shown me that these projections could be formed in several different ways (figs. ii, iii, and iv, at the end of this paper.) In the great majority of cases it happens in this way: It is known that the two lamellæ of the vomer form between them a groove, open at the top and in front, which continues along the crest of the maxillaries, often as far even as the front and lower nasal spine. The edges or lips of this groove receive between them the lower edge of the cartilage, which here presents a very marked enlargement of triangular shape (figs. i and ii, 4). Any one examining a certain number of skulls is struck by the fact that the front part of the osseous septum is often inclined on one side in such a way as to encroach upon one of the nasal fossæ. In these cases the lip of the vomer and of the crest of the maxillaries advances toward this side, and makes with the edge of the cartilaginous septum which inserts itself there, the acute angle which constitutes the lower deviation. The angle is therefore formed by a lower osseous plane and an upper cartilaginous plane.

It is the same with the protuberances which it forms at the entrance of the cavity.

Often this projection is not confined to the entrance of the nasal fossæ, but extends all along the septum. In very marked cases the appearance in living subjects is rather singular; when dilating the nostril and illuminating far into the interior of the nose, one sees running along the septum a sort of pad or cushion, placed laterally. As one examines it from the front to the back, it is seen to rise more and more, conformably to the direction followed by the osseous-cartilaginous junction, the projection of which forms it.

Dissection and the study of dried skulls have taught me that the deviation sometimes continues beyond the car-

tilaginous part, and then inclines toward the suture which follows it ; that is to say, toward the junction of the vomer with the perpendicular lamella of the ethmoid.

In certain cases where the vomer itself presents no inclination, one of its lips may, nevertheless, advance toward one side and there form a protuberance with the lower back edge of the cartilage which inserts itself in this place.

Thus, therefore, the lower deviations and their protuberances are formed by the lateral inclination of the bone and cartilage, and both contribute usually, as sections demonstrate, to the formation of the projection. I have, however, met with subjects where one or the other, alone, was accountable for the prominence. This particularity was often due to a marked incurvation of the front and lower part of the cartilage, or to its oblique implantation (C. figs. iii and iv). Here the lower swollen edge is no longer exactly encased in the bony groove, but overruns it on one side, and forms the projection of itself. In other individuals the effect of this asymmetry is that the protuberance is formed on one side by the cartilage, and on the other by the bony substance (fig. iii), just as if the cartilage had slipped laterally upon the bone.

Figures ii, iii, and iv represent some of the most remarkable sections which I have obtained; they show the different ways in which the substratum of these deformities is constituted in different individuals.

Relations of horizontal deviations to each other.—In the majority of cases I have found that the inferior deviation forms the reverse of the superior deviation; that is to say, that the convexity of the one is turned in the opposite direction to that of the other; for example, in the case most common, that where the septum deviates to the right in its upper part, it deviates, on the contrary, toward the left in its lower part. We have already seen that this conformation generally involves the existence of a protuberance on the side of the convexity of the inferior deviation; here, then, is the explanation of the greater frequency of the spurs in the left nostril.

In certain persons the arrangement is still more irregular:

it is like a kind of torsion or undulation of the septum from top to bottom, by means of which the groove of the vomer and the crest of the maxillaries do not participate in the curve of the lower deviation, but deviate in their front part in the same way as the superior deviation; for example, in case of superior deviation to the right, and of inferior deviation to the left, the right lip of the vomer is projected into the right nasal fossa, and forms a protuberance there.

In the minority of cases, the convexities of the two horizontal deviations face the same way. Here the lamella of the ethmoid bulges on one side (superior deviation), and is as if arched over the vomer; the angle it makes with the latter constitutes the inferior deviation. The protuberances, when they exist, are usually found in these cases on the same side as the two convexities. Sometimes, however, they are on the opposite side, on account of a species of twist similiar to that which I have described for the preceding group.

(I will add that I have at times seen something analogous, but working in a horizontal direction and on the same deviation, the direction of which then varies from the front backward; for example, an inferior deviation, the front part of which directed its convexity to the right, the back part to the left.)

Vertical deviation of the nasal septum.—Besides the horizontal deviation which I have described, I have found, either in the living subject or in the cadaver, anomalies of quite a different kind and which do not seem to have been appreciated according to their importance. These are deviations in the vertical direction. They are not, like the preceding, horizontal or slightly ascending projections, but *folds extending from top to bottom along the septum narium* in its front part, consequently pertaining especially to the cartilage of the septum. These folds present a convexity toward one side, a concavity toward the other. When they extend all the way down, they sometimes obstruct the inferior meatus as a protuberance proceeding from an inferior horizontal deviation would do.

In addition to the deviations which I have described,

there are in certain cases more complicated and more irregular deformities, sometimes to such a degree as to defy all description.

If horizontal deviations are manifestly due to malformations, I have, on the contrary, seen a certain number of vertical deviations which proceeded from traumatic causes, such as a fall, or a blow upon the nose dating from early childhood. Perhaps the irregular deviations which I have just mentioned may also be of traumatic origin.

II.—RÔLE OF DEVIATIONS OF THE NASAL SEPTUM IN SURGICAL THERAPEUTICS, AND ESPECIALLY IN THE CATHETERIZATION OF THE EUSTACHIAN TUBE.

In analyzing exactly the importance of the deviations of the septum narium, it seems to me that the injurious influence which they may exercise in regard to the functions of the nasal fossæ has been exaggerated, whereas enough consideration is not given to the impediments they often occasion in the diagnosis and the treatment of affections of these cavities.

In regard to the first point, it is thought that these malformations may considerably impede respiration and phonation. On this subject, I call attention to the necessity of distinguishing between the two groups of deviations which I have established above.

If it be supposed that the horizontal deviations can oppose themselves to the passage of air, so far as to hinder these two physiological actions, it must not be forgotten that the aërial circulation, although diminished in one half the nose (by reason of the convexity of the deflected septum), is therefore all the more free in the other, on account of its enlargement by the concavity of the septum. There is therefore compensation. It is otherwise with vertical deviations; here there can be no question of compensation, for this deformity narrows one of the nasal fossæ from top to bottom, to the degree of closing it almost entirely in certain cases, without the other being widened on that account, at least at the place where the fold begins. Now, it suffices,

I think, that there should be in the whole extent of the nasal canal one single narrowed point which does not allow the air to pass in sufficient quantity under the ordinary respiratory pressure, to make respiration by the nose impossible.

(I do not insist further upon this point, having enlarged upon it in my article on adenoid tumors.)

If the influence of deviations on the physiological function of the nasal fossæ is exaggerated, the other extreme is fallen into, I think, as to their importance for the diagnosis and treatment of affections of these cavities. It is, however, evident, *a priori*,—and a long experience has proved it to me,—that the convexity of the deformity may hide from sight and screen from surgical operation, all or part of the depths of a nasal fossa, while the concavity may harbor tumors which run the risk of passing unnoticed. This is what happens with horizontal and still more with vertical deviations. We will pass summarily in review, in relation to the effect of these deformities, the pathology and therapeutics of the nasal fossæ, and terminate with Eustachian cathethrization considered from this special point of view.

A.—*Simple chronic coryza.*

Like many other specialists, I am of opinion that the principal part in the treatment of chronic coryza belongs to the galvano-cautery. In a former article (*loc. cit.*) I treated this point, and brought forward the difficulties of sparing the septum in cases where deviation exists. I described in the same place cauteries made specially for this purpose according to a new principle, that of the unilateral action. They are indispensable in cases of decided protuberances, to avoid burning the latter, which I consider as *noli me tangere*, because the cicatrization of cartilage wounds is extremely difficult, especially in the case in question, where the perichondrium is necessarily destroyed by the cautery. I will add briefly that I have succeeded in making these instruments much flatter still, and consequently much easier to use, by turning back the sheet of platinum upon the flat side of the cautery.

B.—*The mucous polypi of the nasal fossæ.*

In following the old methods, according to which the mucous polypi of the nose were torn away with pincers without dilating the nostrils or illuminating the nasal fossæ, the turbinated bones have often been fractured—even torn away. I firmly believe that the protuberances of the septum, often visible to the naked eye on raising the end of the nose, must have met with a similar fate. The present methods, which permit us to radically cure this formerly incurable affection, are, as is known, the use of either the cold or galvano-caustic snare, and the subsequent destruction of the pedicles by the galvano-cautery.

One can readily understand that a marked deviation of the septum may seriously interfere with this form of treatment. The vertical deviation must be mentioned here in the first place; sometimes the convex fold which it forms at the opening of a nostril masks it completely. It then becomes very difficult to recognize the existence of the polypi and to reach them with the snare. Here is a curious example of this kind, upon which I operated in 1878. The patient, aged sixty, who had long been affected with mucous polypi of the nose, presented a vertical deviation. The cartilaginous septum had deviated from top to bottom, toward the left. The right nasal fossa, which was very wide, contained an enormous quantity of tumors easily seen and taken hold of, and which I was able to extract with ease by means of the galvano-caustic snare. On the left, after having removed some polypi which came forward as far as the entrance of the nostril, I was met by the convexity of the vertical deviation. Between the projecting fold which it formed from top to bottom, and the outer wall of the nasal fossæ, there was only an opening the size of a pea, quite filled by an end of polypous excrescence. On the other hand, palpation by the pharynx with the finger showed that the whole portion of the nasal fossa back of this contraction was filled with polypous masses. The patient not being able to endure posterior rhinoscopy, and being obliged to leave Paris at once, I could not operate

200859

upon the polypus from behind, but I was obliged to adopt the method of tearing away, which I only use in case of its being impossible to do otherwise.

I took hold of the excrescence with the snare, and gently drew out, through the small opening, an enormous and very soft polypus, having exactly the shape and size of a white worm (larva of Melolontha vulgaris, May-bug) arrived at full maturity. Immediately after, palpation showed that the fossa was empty. Had it not been for want of time, I could have accustomed the patient to rhinoscopy and then I could have destroyed, as I usually do, the point of implantation of this polypus by means of a galvano-cautery, bent and introduced by the pharynx under the control of the mirror; not being able to do so, I could not promise the patient that there might not be a relapse.

In the case of another gentleman whom I still see occasionally, there is horizontal superior deviation convex at the right, and horizontal inferior deviation convex at the left; the two nasal fossæ were filled with mucous polypi. After relieving the left of those which obstructed it, I finally found still another bunch of small polypi, beginning at the posterior extremity of the middle turbinated bone and niched in the concavity of the perpendicular lamella of the ethmoid, which had deviated to the right. It required persistent effort and an energetic but prudent use of the galvano-cautery of lateral action to destroy these tumors and to preserve the septum intact.

C.—*Epistaxis.*

I merely mention the difficulties caused by deviations in cases of obstinate epistaxis, when they hinder the search after the point of bleeding.

D.—*Nasal pharyngeal douche.*

I call attention very particularly to the importance of deviations of the septum in the use of the Weber douche, not only because the injection passes with difficulty into the nasal fossa which is contracted, but *because it passes too easily into the other which is widened.* Poured into the latter, the

liquid reaches the nasal pharynx superabundantly, and thence passes, behind, into the narrowed nasal fossa. The effect of the contraction of the passage is an augmentation of resistance and of lateral pressure upon the nasal and pharyngeal walls, and finally the liquid may invade the Eustachian tube and even the tympanic cavity.

If too strong a pressure be used (a syphon hung too high above the head of the patient, for example), and a liquid too cold, too warm, too concentrated, or not enough so, a violent otitis media may result from this penetration of the liquid into the cavity.

In my opinion, such imprudences as these have prevented distinguished aurists, particularly in America, from making use of this process, which I believe to be excellent, on condition of employing it according to the following directions:

Injection with gentle pressure (I prefer the use of a syringe, the stream of which can be immediately stopped or checked); tepid liquids, consisting of weak solutions; straight position of head of the patient. Necessity of thoroughly teaching the method and having the person in charge of making the injections practise it before me. In cases of considerable deviations, inject only by the narrowed side.

E.—*Catheterization of the Eustachian tube.*

At the beginning of this article I dwelt upon the importance of a free nasal passage for Eustachian catheterization. We have also seen that one must not be satisfied, in this matter, to speak, as many classical works do, in a general way, of "deviations of the septum"; but examining the question more closely, as we have above,we must distinguish between the different groups of these anomalies. We will now apply the results of my investigations to this special point.

We must first eliminate the horizontal deviations, which I call the *superior*. Not bearing at all upon the inferior nasal meatus, they could not impede catheterization, which has this canal for its field of operation.

On the other hand, I think I have found in inferior devia-

tions, and especially in the protuberances or spurs so often formed by the anterior extremities of these deformities, the principal cause of the diseases of the nasal passage and of the difficulties which are so common in operating through it. Examination of the museum skulls has proved to me that the inferior deviation directs its convexity oftener to the left than to the right, and that consequently the protuberances exist oftener at the left. This particularity seems to explain a fact known, but insufficiently explained up to the present time: *the greater difficulty of the catheterization of the left ear.*

I am in the habit of accompanying the notes which I take of all my patients with elementary drawings in cases which present an anomaly of conformation or any injury worthy of notice. I represent in this way perforations of the drum, exostoses of the auditory meatus, obliquity of the uvula, hypertrophy of the tonsils, deformities of the nasal fossæ, etc., etc. Now, in the majority of my drawings of the septum narium, I find the protuberance on the left. Since 1877, for instance, I have drawn twenty-eight cases where it occurred on that side, eleven where it existed on the right, and fourteen where both sides were affected. And yet I have only drawn cases of nasal obstacles developed to such a degree that they seriously hindered catheterization, and of which I wished to keep a memorandum for future use.

We will now inquire how these protuberances, which so often present the greatest obstacles to catheterization, impede the progress of the catheter. As I have often proved by means of the combined method, which I shall explain later, as soon as the beak of the catheter approaches the entrance of the nasal fossa it strikes against the protuberance which faces it, and which obstructs the width of the inferior meatus where the operation is to be performed (*vide* fig. ii, where 2 represents a slightly developed protuberance). It is then that the Schneiderian membrane, tightly squeezed between two hard substances, viz.: the catheter and the osseous-cartilaginous substratum of the spur, suffers a strong pressure, very painful on account of its abundance of sensitive nerves. (What occurs

here might be compared—*mutatis mutandis*—to what happens when the tibia is struck; the pain results in the same way from the compression of a thin skin between the contusing body and the underlying tissue in contact with the bone.) Thence the fact which I mentioned above, and which is known to all aurists, that many patients at the beginning of catheterization withdraw the head, and refuse the continuance or repetition of the operation. If one persist in advancing the catheter, the protuberance causes the point of the instrument to deviate; it then strikes against the lower turbinated bone, or else passes into the middle meatus. In both cases it is manifestly impossible to complete the operation, unless by an energetic downward pressure, very painful for the patient, the instrument be forcibly drawn back into the inferior meatus and force a passage while maintaining it. In certain cases of vertical deviation the fold of the cartilage continues all the way down, and may obstruct the inferior meatus as a protuberance would do.

Even Politzer's mode of procedure may become difficult on account of the protuberances occasioned by one or the other of these deviations, for their compression by the end of the balloon causes pain to certain patients. It is useful, in such a case, to employ the modification which I proposed long ago, and which, indeed, has been generally adopted: it consists in adding to the end of the balloon a little soft rubber tube, which prevents any disagreeable pressure.

I will add that the projections may make the simple examination with the nasal speculum disagreeable to the patient, on account of the tip of the instrument striking against these highly sensitive spurs.

III.—NEW METHOD FOR AVOIDING NASAL OBSTACLES IN THE CATHETERIZATION OF THE EUSTACHIAN TUBE.

Instead of the probing, so painful to the patient, to which one is forced to resort in the frequent cases where protuberances exist, is it possible to imagine a truly scientific method to facilitate catheterization under these circumstances?

I begin by rejecting any sanguineous operation, such as the ablation of the deviated portion of the septum. In such an act of surgery, the shot would go far beyond the mark, especially taking into consideration what I said previously in regard to the difficult healing of wounds of the cartilage.

The point, therefore, is to get round the obstacle and not to remove it *manû armatâ*. This can be managed in many cases by a process which is known, *catheterization by the opposite nostril*. But cases where protuberances exist on both sides of the septum are not rare, as I have already explained, and then passage is hindered in both nasal fossæ, especially for catheters with a beak long enough to penetrate into the tube of the opposite side. And it is often very difficult by this method to make the instrument penetrate far enough forward into this canal and in a good enough direction to allow the air to penetrate sufficiently, much less liquid substances or bougies! For some years I have used a process which may be said to allow the catheter in all cases to pass through *the narrowed nasal fossa*, sparing meanwhile the sensitiveness of the patient. This method suggested itself to me from the habit of exploring the nasal fossæ of all my patients: it is *catheterization guided by* SIMULTANEOUS anterior rhinoscopy, which process I will now explain. Great importance is justly attributed to the exploration of the buccal and naso-pharyngeal spaces, in the study of diseases of the ear. I have insisted upon this point since 1865, and my efforts have perhaps contributed, with those of such men as v. Troeltsch and Voltolini, to calling attention to this subject.

The point now is to take another step in advance, and to join to the indispensable auxiliaries of the aurist the attentive study of the nasal fossæ, which is no less important in his specialty than is that of the pharynx. The importance of this study is obvious: the interior mucous lining of the nose is continuous with that of the entrance of the tube; the permeability of the nasal cavities influences the access of air to this canal, and finally catheterization and the system of Politzer have the interior of these cavities for their

operating ground. In considering, therefore, the importance of the conformation of the nasal fossæ for these operations and of the condition of their mucous membrane for that of the middle ear, I lay down as a principle *the necessity of exploring the nasal fossæ of every person requiring our attention for an affection of the ear*, unless the disease be manifestly confined to the external ear or to the auditory meatus (eczema, foreign bodies, furuncles, etc.). I do not go so far as to require, in every case, the practice of posterior rhinoscopy, which often necessitates a series of preparatory visits before succeeding completely. On the other hand, anterior rhinoscopy is performed with great ease and always succeeds the first time.

On dilating the entrance of the nasal fossæ by means of the speculum, and projecting (natural or artificial) light into these cavities by the aid of the concave reflector, the eye penetrates to a great depth into the interior of the nose. The first glance shows the conformation of the septum and of the inferior and middle turbinated bones as well as the condition of the mucous membrane and its secretion. We know that in certain cases of abnormal size of the nasal fossæ (ozæna) the eye may pierce as far even as the posterior wall of the naso-pharynx, and on causing the patient to make the motion of deglutition the phenomenon of the pharyngeal contraction may be observed.

In exploring the interior of the nose the glance of the observer includes particularly the anterior and inferior regions of the nasal fossæ, precisely the part where are located the protuberances which form the special obstacle to catheterization in regard to the passage of the instrument through the nose. This same glance shows the operator whether the conformation be normal or the reverse, and, consequently, whether the catheter will pass easily or with difficulty. In the case where anomaly exists, he recognizes at once the nature and configuration of the obstacle. Besides, and on this point I would lay special stress, this observation shows him at once how he can remedy these inconveniences by *my method: catheterization combined with anterior rhinoscopy.*

The surgeon would certainly be blamed who performed

an operation by sense of touch and without the aid of sight upon a part accessible to his gaze—the "oculis subjecta fidelibus" of Horace. As incredible a thing happens, however, daily, even in the most difficult cases of Eustachian catheterization! No one thinks of performing this operation while inspecting, at the same time, the nasal fossæ, which are rendered accessible to the sight by the speculum and lighted by the reflector. This process, the idea of which ought to come, it would seem, to the mind of every aurist, has not, to my knowledge, been indicated up to the present time. I have had occasion to explain it before numerous confrères, both at the last meeting of the International Congress of London (1881), and in Paris, and, to my great surprise, I have met no one who had put it in practice.

Method of Operating.—When catheterization is to be performed upon a patient, and inspection has made evident the regular conformation of the nasal septum, I take off the speculum and the reflector, and proceed according to the usual methods. If, on the contrary, there be a protuberance on the side to be operated upon, I leave the speculum in its place, and also keep on the reflector to light the operating ground. It is plain at once that in proceeding according to the usual method, that is to say, in introducing the catheter the point downward, the beak of the instrument would inevitably graze the protuberance which bars the inferior meatus to a greater or less extent in different cases (see fig. i; the drawing represents a protuberance slightly developed). But one discovers at the same time farther beyond, an interstice (fig. i, 3) having the protuberance on the inside, the inferior turbinated bone above and behind, and the floor of the nasal fossæ below. It is by this path which presents itself to view, already marked out, that the catheter is to be surely and easily directed. To do this, the instrument should first be turned around its longitudinal axis, so as to place the beak outward and to present it in face of this interstice. In advancing it will soon be possible (as soon as the protuberance is passed) to make it resume its normal position, that is, the vertical direction, for, as we have seen, the horizontal inferior

deviation rises as it progresses toward the interior, and soon lifts itself above the inferior meatus.

One then performs what is called "le tour de maître" (the master-stroke), to borrow this term from urethral-vesical surgery. But it is going a great deal too far to recommend making as complete a movement as is done in the catheterization of the urethra, that is to say, turning the instrument through an arc of 180° around its longitudinal axis. According to my experience, a rotation of from 45° to 60° generally suffices to accomplish the object, which is merely to avoid the protuberance. (Fig. i represents a small protuberance. It would suffice in such a case to turn about 45°; where the spurs are more developed in width and height, an increased rotation is necessary.) Guided by my method one need no longer perform "le tour de maître" in an empirical and exaggerated way, but it becomes a rational process exactly proportioned to the exigencies of each case, and where the eye of the operator enables him to avoid all painful contact. In certain cases where the protuberance closes the whole width of the meatus, and where the inferior turbinated bone is very large, I have sometimes been able to manage in *another way:* As there is often in this case a little free space left below the prominence, the catheter must be made flat by turning the beak in or out, and it can thus be slipped forward. Inspection during catheterization teaches something more still: it becomes obvious at once that the opening which is before one (fig. i, 4) could not, as a rule, give passage to ordinary catheters without their causing severe pain to the patient on account of their size, their curve, and the length of the beak. I use, therefore, especially for the latter process, where it is necessary to pass below the spur, delicate catheters having a very short beak. These instruments are all the more indispensable, because in spite of every precaution the prominences sometimes press upon the longitudinal axis of the catheter, causing a deviation toward the exterior. The beak of the instrument, having passed beyond the nasal fossæ, then finds itself too near the Eustachian tube. When, therefore, under these circumstances the ordinary catheters having a

long beak are used, the point, as soon as it is turned so as to place it in the entrance of the tube, strikes against the lateral wall of the pharynx and rotation becomes impossible or, at least, very painful. On the other hand, in using a catheter with a short beak, its point only describes, in turning, an arc of a circle of small radius, and can therefore make the necessary movement of rotation without being interrupted by contact with the pharyngeal wall.

In these cases I like to use catheters of a particular kind: they are thin instruments, having a beak of only seven millimetres and a half in length, which makes *an exact right angle* with the stem. This shape not only facilitates the passage through the nose, but also the rotation of the beak in the pharynx. I had this pattern made by Luer about fifteen years ago for a person in whose case the nasal passage was extremely narrowed, probably by protuberances—I say "probably," for I had not, at that already distant period, recognized the anomaly in question.

New nasal speculum.

There are at present several kinds of nasal specula, all more or less useful for the examination of the nasal fossæ. I used at first, in my process of catheterization, the pattern which I described (*loc. cit.*), and which is nothing more than the usual speculum, only with much thinner branches than are usually made. But all these instruments, for the method of operation which I have just explained, present the following inconvenience: when once the beak of the catheter has passed through the entrance of the nasal fossa which is narrowed by the protuberance, the further presence of the speculum becomes not only useless, inspection being no longer necessary, but even troublesome, for it interferes with the free advance of the catheter, and its fixation at the time when inspiration is required. If it be taken off at this moment, it is necessary to turn the screw of the instrument with one hand while the other secures the catheter. The speculum being no longer held in place, receives, in unscrewing it, concussions against the catheter, which are painful to the patient. I have been led, on that account, after many ex-

periments upon the cadaver (by means of a thin sheet of lead, which is easily shaped as one likes), to a special speculum, different from the old instruments and from the new model of Creswell Baber. My speculum (fig. v, where it is drawn a little too long) is a metallic tube shaped like a truncated cone, at the large end of which a sort of handle or palette is implanted almost perpendicularly to the axis of the cone. A rather wide slit extends the length of the speculum on the side opposite that which holds the palette. The instrument having thin slides is much lighter than ordinary specula, and its contact with the catheter would not displace the latter in so painful a manner to the patient as the ordinary heavy and cumbersome instruments do.

After having introduced this speculum into the entrance of the nasal fossa, the palette being above, it is held there by slightly pressing the latter with the thumb of the left hand, the fingers of which are placed against the back of the nose. The slit is in this way directed downward and horizontally so as to leave the passage free for the introduction of the catheter. When the catheter has passed the narrowed part, the speculum is taken off by turning the slit upward ; it then drops off of itself, the slit making room for the stem of the catheter.

By using the combination of means just explained, I have been able to conduct catheterization successfully and without causing suffering to the patient, under circumstances where the deviation of the septum made the operation impossible or, at any rate, extremely painful by other methods. I have even succeeded where experienced hands had failed, and where, I hasten to add, I should not, certainly, have been more fortunate without the aid of my method.

In regard to the sensation experienced by the patient, the difference between the ordinary processes and mine was such in many cases that the use of the latter was loudly demanded by all who had once tested its advantages. But even in using it, it is often necessary to proceed with much delicacy and circumspection in order to guide the catheter through the two or three dangers which obstruct its way. I say " three " dangers, for the situation is again aggravated

in some cases by an elevation of the floor of the nasal fossæ, which then brings the number of obstacles up to three, counting the inferior turbinated bone and the protuberance.

Explanation of Figures.

I drew fig. i from life, and figs. ii, iii, and iv from sections made upon three different cadavers, selected from the large num-

Fig. i.

Fig. i.—1 Inferior turbinated bone. 2 Protuberance of the septum. 3 Free interstice.

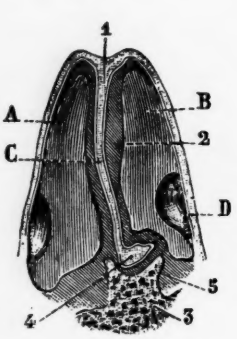


Fig. ii.

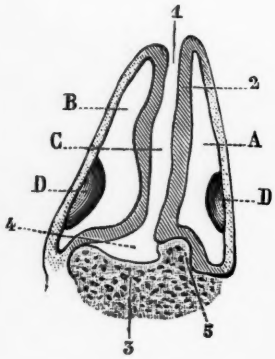


Fig. iii.

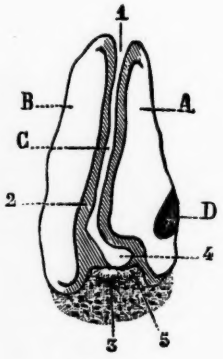


Fig. iv.

Figs. ii, iii, and iv.—Sections of the cartilaginous part of the nose. A, B, Nasal fossæ. C. Septum. D. Inferior turbinated bone. 1 Cartilage of the septum. 2 Mucous membrane. 3 Bone. 4 Cartilaginous protuberance. 5 Osseous protuberance.

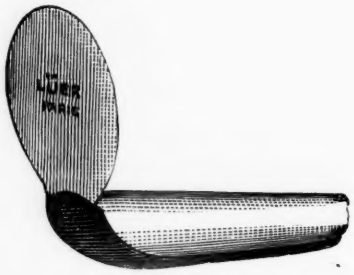


Fig. v.

ber which I have dissected for this purpose. The section was in an almost perpendicular direction from top to botom, on a slightly inclined plane, that is to say, making with the forehead an acute angle open at the top. As it has only concerned the cartilaginous part of the nose, the horizontal superior deviation, which bears particularly upon the perpendicular lamella of the ethmoid, is not shown in my drawings ; the only traces of it are found in fig. ii, where it has partially attained the cartilage of the septum also.

Fig. v was drawn by M. Badoureau, engraver. The instrument is represented a little too long in its horizontal dimensions.

THREE SERIOUS CASES OF MASTOID DISEASE, WITH REMARKS.

By H. KNAPP.

NO department of aural surgery is more important than the inflammation of the tympano-mastoid cavities, when it extends into the cranium. The aural questions are then at once converted into vital questions, which the specialist has to solve with all the grave responsibility that is so frequently inherent to the duties of the general practitioner. Despite the decided progress in our knowledge and management of such cases during the last decades, there are still many points either unexplained or insufficiently appreciated, if we aim at accuracy of diagnosis and seek for unambiguous indications of treatment. The great practical question: "what are the conditions under which the mastoid process should be opened"? can to-day be answered with more precision that it could have been ten and twenty years ago, yet the most experienced aurist will not fail to welcome further clinical and pathological contributions either as confirmations or extensions of his views on this important subject. In illustration of this proposition, I beg to select three cases from my recent practice, accompanying them with a few remarks which they forcibly suggest.

CASE I.—*Acute purulent otitis from sea-bathing; perforation of the occipital bone; drainage of the cranial cavity for three months; death by cerebellar abscess; autopsy.*

Mr. John D. Strickland, of Brooklyn, a healthy man of about thirty-nine years, consulted me for the first time on Aug. 15, 1882.

He was very fond of sea-bathing. During the hot summer of 1882 he went into the ocean every day, swam long against the breakers, lying by preference on his right side. On Aug. 6th he went swimming at 7 A.M. and felt no immediate pain or discomfort anywhere, but at 2 P.M. of the same day he experienced earache, headache, and impairment of hearing. Though these symptoms continued with varying intensity, he went bathing twice again before he consulted me. I found his right *Mt* red and dull, bulging in its upper part, the folds and handle of the left slightly red; relief normal; *h* R $\frac{1}{8}$ on application to ear only; L *h* $\frac{1}{24}$ (ear), $\frac{1}{8}$ (temple), 0 (mastoid); *V* R $\frac{5}{60}$, L $\frac{20}{60}$. Tuning-fork from forehead best in R, better when ears were closed. Politzer positive; R with a dry snap, after which *h* $\frac{1}{\infty}$ (ear and temple), *V* $\frac{20}{60}$, as in L ear, but mastoid remains *h* 0. Moderate congestion and swelling of the pharyngeal mucous membrane. Ordered two leeches behind each ear, and rest. Bathing forbidden. On Aug. 23d he came again, materially improved. R *Mt* still red, L almost normal. Aug. 28th. Had been less careful. R *Mt* red all over, and bulging except at handle, in front of which two hemorrhagic spots. Pain extending over the adjacent parts of the head, especially toward the forehead and occiput. I made a paracentesis, 4 *mm* in length, in the anterior lower part of the drumhead. Blood escaped, but no pus. Politzer positive with perforation whistle, but no evacuation of mucus or fluid, though Valsalva's experiment gave a gurgling sound before the operation. The operation was made in the forenoon; at 9 P.M. a profuse purulent discharge set in, and the pain disappeared. I gave him quinine internally, 0.25 to 0.50 a day, boracic-acid solution to cleanse the ear with, and impalpable boracic-acid powder and absorbent cotton to be put in the ear after the cleansing. During the whole month of September there was more or less discharge from the ear, pain in ear and head varying, more pronounced when discharge was scant or ceased, and absent when the ear ran freely again, which was favored by warm water and vapor ear baths. The pain in the right occipital region never left him entirely, and was mostly accompanied by right-sided frontal headaches. The mastoid region was free from any abnormity, so often and carefully as it was examined. There was no fever, no mental disturbance, no cerebral symptoms except the headache. Patient went to his business off and on, though against my orders.

On the 4th of Oct., after an absence of two weeks, he presented

himself to me again, complaining of more pain in his left occipital region, which, on examination, I found swollen and distinctly fluctuating, though but little tender to the touch, and not red at all. The mastoid was normal, the fluctuation and greatest swelling were 6 *cm* behind the ear, and 2 *cm* above the level of the auditory meatus. I told the patient that between the skull and the scalp there was pus which must be liberated. He consented, and as he was very timid and nervous, I took him to the Ophthalmic and Aural Institute, where, under ether, I made an incision of 3 *cm* in length through the fluctuating part of the scalp down to the bone, and evacuated a considerable quantity of creamy, inoffensive pus. The bone felt denuded to the extent of 2.5 *cm* in diameter, but was smooth, with a depression in the centre of the incision. I put a small perforated silver tube in the wound, covering it with absorbent cotton. The patient was not to be induced to stay in the hospital, but drove home greatly relieved. For the next week, he came to the office with his wife almost every day. There was a free discharge of creamy pus from the wound. The wound was dressed twice a day, the canula cleansed and re-inserted. Patient had lost all pain, and felt very well. The *Mt* was plainly visible in its details ; it was red, and had a small, round, clean perforation in its antero-inferior part. $V \frac{20}{60}$ and the case looked as if it advanced toward a speedy recovery. This was, however, a sad disappointment. After a week, he complained again of his pain over the right eye, which continued more or less intense during his whole illness. A considerable quantity of creamy pus, which never smelled offensive, was discharged through the silver tube every day. With a probe, it could be distinctly ascertained that the pus came from the interior of the skull through a canal in the occipital bone about 4 *mm* in diameter, with rough, ragged edges. At the bottom of the canal, the probe pushed against a resistant fibrous membrane, evidently the dura mater. The outer surface of the temporal bone, as far as denuded, felt perfectly smooth, not indicating caries. The patient's pulse was 76, his temperature not increased. His appetite was good ; his sleep, however, frequently disturbed by the frontal headache.

On the 19th of October, there was a decided aggravation in his symptoms. The frontal headache was very severe, prevented him from sleep ; he felt oppressed, sick at his stomach, was very pale, and fainted for five minutes. He had chills, and cold and hot perspirations. When he came to me on the 20th of Oct., I found

his pulse 104; temperature 38° C.; his general condition better; free discharge from the drainage tube. At the lower part of the occiput, 5 *cm* below and 1.5 *cm* behind the opening, there was a considerable swelling of the skin, pressure on which indicated deep fluctuation, and forced a moderate quantity of pus out through the opening above. I incised the soft parts down to the bone, but liberated no pus, and inserted a drainage tube into this incision also.

Oct. 21st.—Felt better; no chills; free discharge from upper opening, none from lower; swelling, the same; pulse, 96; temperature, 38.8°.

Oct. 23d.—More swelling in lower part; incisions deeper and longer; no pus.

Oct. 24th.—No pus yet; swelling less; pulse 84; feels tolerably well.

Oct. 26th.—Had headache yesterday. After poulticing, copious discharge of pus from the lower opening.

The discharge for the next ten days was interrupted from the lower, constant and free from the upper, opening. The bone at the lower incision felt smooth, not depressed in any place.

Nov. 6th.—Had a good deal of headache and vomiting yesterday. The discharge was scant. Poulticing for three hours was followed by abundant discharge and complete relief from headache.

For the next nine days, scantiness of discharge, headache, nausea and vomiting alternated with free discharge and general comfort. Opthalmoscopic examination, which, in combination with functional examination, had been frequently made during the preceding months, now, for the first time, revealed a moderate swelling at the inferior border of the right optic disc, and some retinal hyperæmia; the same condition, less marked, was noticed in the left eye. Then, for two weeks, he felt comparatively well; had not had a headache for eight days; the lower opening had closed and the swelling disappeared; the discharge from the upper was free and steady. I took care to keep the bony canal open; whenever granulations formed I scraped them off with a sharp spoon, especially from the bony walls of the canal.

On November 29th, a fluctuating swelling had formed 2.5 *cm* up and back from the originalo pening. On incision a considerable quantity of creamy pus escaped, and the probe passed also in this place into the cranial cavity by a narrow, ragged, fistulous canal

in the bone. A drainage tube—a perforated silver canula—was inserted. The discharge from this perforation ceased in a few days, and the opening closed in two weeks.

The original fistula continued to discharge regularly ; the patient felt tolerably well ; his complexion, which was naturally pale, had at times a yellowish hue. The symptom of which he complained most was pain in the right side of his forehead ; the occiput was also painful at times, the parietal region rarely, the mastoid never. The mastoid region and its vicinity were, during the whole course of the disease, free from any abnormity ; the auditory canal was likewise free, the drumhead perforated, but not bulging ; very little, and, most of the time, no discharge ; no granulation tissue in tympanic cavity. As the patient could never be persuaded to leave his home, I gave his family physician, Dr. W. F. Schwalm, of Brooklyn, at the beginning of his disease, a full statement of his condition, telling the patient that rest in bed was most conducive to his recovery, and that whenever he felt worse it would be better not to come to New York, but to call me or another aurist to his bedside, should his physician find it advisable. He always assured me that the air did him good, and he felt a desire to take a drive every now and then.

At the beginning of January, 1883, however, his disease took a decided turn for the worse. He was obliged to keep his bed ; had severe headache, nausea, vomiting ; was slightly delirious at times ; had twitchings in his limbs ; his neck was stiff, and his head drawn back and to the right side. The purulent discharge from the opening continued, but was bloody at times. January 9th I was called to see him in consultation with Dr. Schwalm, and found him still in the condition just described. On exploring the wound with a probe, and scraping the osseous canal with a sharp spoon, a moderate quantity of very dark blood oozed out for about five minutes. His pulse was 84, his temperature 99° (Fahrenheit). There was a moderate degree of congestion of the retina, and some œdematous swelling of the optic disc and its surroundings, more marked in the right than in the left eye.

On January 10th the pain extended over the whole head, the deliria and convulsive twitchings were more pronounced ; toward morning he became comatose, and died at 10 A.M., January 11th.

January 12th I made a **post-morten examination**, assisted by Drs. Schwalm and D'Oench. Seven *cm* behind and about

3 *cm* above the level of the auditory meatus, there was a perforation in the cranium, from 3 to 4 *mm* in diameter. The bone in its vicinity was hyperæmic, but not carious. 2.5 *cm* in and up there was another small place where the skull was hyperæmic and slightly depressed at the centre, but the probe did not penetrate. This was the spot where the upper perforation had been, but had closed again. The remainder of the skull was normal; in particular I may mention that the skin, periosteum, and outer bony surface of the mastoid process and its vicinity, far beyond the mastoid foramen, were perfectly normal. The meninges and sinuses of the brain exhibited no alteration. The inner surface of the cranium showed the same hyperæmic condition as described above, at the places where the two perforations were situated. The original perforation, which had remained open, was located about 1.5 *cm* above the greatest convexity of the right transverse sulcus, about 3 *cm* in and upward from the lateral angle of the occipital bone. The point of the perforation was situated either in the lambdoid suture, or near it. The hyperæmic point, where the last perforation had taken place, was about in the centre of the right superior fossa of the occipital bone.

The right half of the tentorium cerebelli was markedly raised over the level of the left half, but showed no other abnormity.

On detaching the dura mater from the occipital and petrous bones, it was found unbroken. Only at the place of the first perforation it was red, thickened, soft, and uneven, yet not (macroscopically) perforated. The lateral sinus was intact, containing dark blood, but no coagula, and its walls were smooth.

At the outer surface of the lateral sinus a thick streak of pus led along the transverse sulcus to a larger collection of pus at the lowest part of the sigmoid fossa. Here the inner table of the bone had completely disappeared in a round area of about 2 *cm* in diameter. It was the free inner open side of an abscess cavity in the interior of the mastoid process. This cavity had bony and ragged walls, and a probe penetrated without resistance from it into the tympanum and auditory canal.

The petrosal sinuses, as well as the posterior and anterior sides of the petrous bones and the tegmen tympani, showed no alteration.

On incising the tentorium cerebelli an abscess the size of an English walnut was found in the middle and outer part of the little brain. It was filled with thick, somewhat greenish, not offensive, pus; had no distinct walls to separate it from the adjacent, not softened cerebellar substance.

The tissue and ventricles of the brain and medulla oblongata exhibited no lesions discoverable with the naked eye.

I removed the petrous bone and the left hemisphere of the cerebellum, but only one fact was found of interest for our present purpose, namely: the mastoid cavity communicated with the tympanic by a very small opening, an unusually narrow orifice of the mastoid antrum.

REMARKS.

The most important feature of this remarkable case was the entire absence of external symptoms during the whole course of a severe suppurative inflammation in the interior of the mastoid process. Commonly the mastoid region is tender to the touch, or on percussion; its integument is swollen and red, at least in a certain degree.

The next unusual feature was the misleading character of the pain. In acute and chronic mastoiditis interna the pain commonly starts from the mastoid region, radiates over the whole corresponding half of the head, and is most intense in the parietal region. In our case the mastoid region was never painful at all, the parietal not much, the occipital moderately, the frontal most severely and most persistently. This led me into the belief that the inflammation had extended from the midde ear through the tegmen tympani to the meninges of the adjacent middle and anterior lobes of the brain.

Then suddenly, in the sixth week of the disease, an abscess made its appearance three or four centimetres behind and two centimetres above the mastoid process, and probing

demonstrated that the pus came from the cranial cavity, through an opening in the occipital bone or in the lambdoid suture. This was followed by an abscess from gravitation at the lower part of the occiput, and later by another abscess farther back and upward on the cranial bone, likewise through a perforation of the skull. My opinion then was that a communication between the middle ear and the cranial cavity had formed, and that the pus was deposited between the dura mater and the bone: in the front part, causing the frontal pain; in the back part, causing the occipital pain, as well as the perforations of the bone. As the case was of recent date, and the evacuation of pus was followed by complete though only temporary relief of the symptoms, I thought that extensive caries interna did not exist, and that the patient would soon get well if the outlet of the pus was kept free. I had no doubt that the escaping pus was furnished by the cavities of the tympanum and mastoid, and crept along the transverse sulcus between bone and dura mater, and expressed my views in this respect to Dr. W. J. Morton, to whom I had an opportunity of showing the case at my office.

The supposition of a cerebellar abscess could not be entertained with any degree of probability before the last two weeks of the patient's illness.

The most noteworthy features of the whole case are, it seems to me, the perforations in the temporal bone so far away from the original seat of the inflammation, and the effectual drainage of an intracranial suppuration for three months. The autopsy showed that in this case, as in most others, the chief focus of the formation of pus was the mastoid cavity, and I shall, in future, be more inclined to open this cavity, even when no external signs of mastoid suppuration are present. In this way a life may be saved every now and then. If the operation proves the diagnosis to be incorrect, it rarely does harm, and may even do good by its "revulsive effect." Among others, SCHWARTZE, whose merit in this department is so deservedly praised, draws the indications for opening the mastoid wider than I have hitherto done. My hesitation as to the more frequent perform-

ance of this operation was based on two facts: (1) We see so many cases with severe otitis media, even when pronounced cerebral symptoms are present, get well; the natural fatal termination is rare, almost exceptional, while, on the other hand, the statistics of the operation show a considerable death-rate—about 11 % in Schwartze's series. (2) I have assisted in a number of trepanations of the mastoid, and have performed some myself, where the diagnosis was erroneous, the extension of the disease taking place not through the mastoid, but through other well-known channels. Even if such cases afterward do not terminate fatally, the fact of having undertaken an important operation on an erroneous supposition, is humiliating and depressing.

Among the variety of symptoms in acute and chronic otitis media, the one which has guided me more than any other, is *persistent headache* radiating from the ear over the corresponding half of the head. If this was present, and the mastoid showed any symptoms of active participation in the inflammation, I thought trephining indicated. The case under consideration, and a few others that have been published,[1] make, however, the operation justifiable even when there are no external symptoms of mastoid suppuration present, provided that sinus thrombosis can be excluded.

In recommending an extension of the indications for trephining as above stated, I am satisfied that we shall occasionally be disappointed, even if mastoid symptoms are pronounced, and beg to report briefly a case in support of my opinion.

CASE 2.—*Chronic mastoiditis interna; sclerosis; trephining; no pus; death from meningitis or abscess.*

Mrs. Rob. Libas, æt. forty-five, of New York, under the care of Dr. Schwedler of this city, consulted me with the doctor Dec. 6, '79. She had never had otorrhœa; six months previously, for the first time, pain behind the right ear; autophony. In September and October intense headache, almost constant, most on vertex and occiput.

Status præsens.—Pain on pressure behind ear; vertigo; loss of appetite; pale complexion; hearing almost normal; h $\frac{12}{24}$, v $\frac{20}{20}$.

[1] See the case of Dr. F. T. Brown in this number.

Tuning-fork from forehead on both sides. *Mtt* somewhat sunken; handles retracted. Right mastoid from its tip to 1.5 *cm* above its base slightly swollen from thickening of subcutaneous layer; skin somewhat red and wrinkled. My diagnosis was that an acute catarrhal otitis had induced a chronic mastoiditis interna, with extension of the irritation to the adjacent intracranial structures. I recommended rest, local depletion; counter-irritation and derivatives to bowels and skin.

On Jan. 28, '82, I saw the patient again with Dr. Schwedler. The treatment had been carefully carried out, and the patient had had all the benefits rest could give her, yet she had never since been free from right-sided headache. The mastoid was tender on pressure and somewhat puffy. No discharge; hearing normal. The pain in the head was such, and had lasted so long, that we thought trephining should no longer be delayed. As the patient gladly consented, I opened the mastoid with a drill on Jan. 29th. Periosteum and bone proved healthy. The drill entered 9 *mm* before the cavity was reached. There was free capillary bleeding from the bone, but no escape of pus. No general reaction followed the operation; the wound suppurated; the bone was bare but smooth. The patient felt better for a month, then the headache returned, and she died in June, 1880, from meningitis or abscess.

It is a pity that the autopsy in this case could not be obtained. Sclerosis of the mastoid terminating fatally is not common, and there is a number of cases on record in which the trephining of the mastoid under similar conditions brought entire and permanent relief, as, for instance, in the case which I published in the tenth volume of these ARCHIVES, p. 365, etc.

Another case, with imperative indications for trephining, and a perfect success of the operation, may conclude this communication.

CASE 3.—*Acute purulent tympano-mastoiditis; severe headache; optic neuritis; opening of mastoid; recovery; restoration of normal hearing.*

Mr. Sam. Rosenthal, æt. twenty-five, of this city, called me to his residence on May 25, 1882. Three weeks previously, after an

exposure, he had had severe earache and headache on his right side, followed in a few days by profuse discharge from the ear. The pain abated for several days, then it returned, and lately the discharge had become scant, and the headache more intense. I found perforative otitis media purulenta; the mastoid, which on both sides was unusually developed, somewhat swollen and painful; the hearing greatly reduced, bone-conduction preserved distinct though not very marked neuro-retinitis in the right eye, and some congestion and œdema of the retina also in the left. The headache was very severe; the patient was feverish, had no appetite, could not sleep, and was greatly depressed. I told him to come to the Ophthalmic and Aural Institute, and if in a few days there was no decided improvement, the bone behind his ear would require an operation. He came at once, had leeches applied before and behind his ear, stayed in bed, took an aperient, and perspired freely. The symptoms abating in no way, I made, May 30th, with a strong knife, a deep incision, 3 *cm* in length, from the tip of the mastoid process to its basis, 1 *cm* behind the insertion of the auricle. The lower part of the bone felt hard and smooth, the middle and upper rough and soft, so that the knife, used with considerable force, cut through the bone 1 *cm* in length. I enlarged the incision by inserting the sharp end of the ivory handle of the scalpel into it, and broke the bony edges off by pressure from within outward. Having thus obtained an opening of 1 *cm* long and 6 *mm* broad, I introduced a sharp spoon, explored the interior of the mastoid process, and discovered a large abscess cavity, the walls of which were rough and, at the medial side, defective. I evacuated the contents with the spoon as far as feasible, and then syringed the cavity with a concentrated warm solution of boracic acid. After this I inserted a perforated silver tube, covered it with absorbent cotton, and held it in position by a flannel roller. The wound was syringed and dressed in this way twice a day. On the second day the water injected into the mastoid escaped from the ear-canal. The syringing had to be done gently, as the patient felt dizzy when the water was injected into the mastoid, but not when injected into the ear. There was a good deal of granulation tissue in the mastoid cavity, which was repeatedly scraped out with a sharp spoon. The partition walls had all been broken down by the suppuration, and the rough walls could be felt on all sides except the inner, where the spoon pressed against soft tissue, the dura mater. The suppuration gradually diminished, the headache disappeared, the neuro-retinitis improved, and the

patient was discharged from the hospital twenty-five days after the operation. He came to me twice a week; when I syringed the cavity and kept it and the opening clear from granulations. The cavity gradually diminished in size. At the beginning of October there was no discharge from the wound any more. I left the canula off; the wound soon closed with a depressed scar, and the patient has had no trouble since. On Oct. 31st the *Mt* was found restored, the handle of the malleus red, the light spot almost normal; $h \frac{2}{24}$, $v \frac{20}{20}$. The patient made a business journey through the country for six weeks, which caused no discomfort, and he has remained well up to date, February, 1883.

In this case the pus had no doubt penetrated from the mastoid into the cranial cavity as in the first case, which is clearly demonstrated by the severe cerebral symptoms, the neuro-retinitis, and the defects in the inner table of the mastoid found on probing during and after the operation. The outer table, which was soft at the time of the operation, would surely have given way soon, and the pus would have found an external outlet, as is noticed so frequently. Yet the operative treatment was decidedly indicated, as it furnished an *early, direct, and free* avenue for the removal of the morbid contents of the mastoid cavity, either spontaneously or by instruments. In our first case this avenue of exit was established by nature, but it proved insufficient by being too late and too far away from the original focus of suppuration. Only the entire absence of any abnormity in the mastoid region deterred me from an operation which might possibly have saved the patient's life. The happy termination of the third case, and the post-mortem conditions of the first, furnish as good an illustration as can be obtained of the importance of opening the mastoid early and sufficiently in purulent mastoiditis interna which extends into the cranium; and even if nature has established an opening, this opening may require operative enlargement, or another may be necessary at another place if the course of the disease continues unfavorable. To the reader acquainted with the modern otological literature, I need not say that this rule, so forcibly suggested by the above cases, has been emphatically advanced by Schwartze and others as the result of similar observations.

A CASE OF ABSCESS OF THE MASTOID, WITH ENTIRE ABSENCE OF TENDERNESS, HEAT, OR SWELLING OVER THE SUPPURATING PART, WITH A CONSTANT DISTANT PAIN NEAR THE OCCIPITAL PROTUBERANCE. TREPHINING; RECOVERY; OCCURRENCE OF ERYSIPELAS DURING CONVALESCENCE.

By F. TILDEN BROWN, M.D., New York.

John McOnerney, age forty-eight, came to Doctor Roosa's clinic at the Manhattan Eye and Ear Hospital on September 14, 1882. Examination by Drs. Edward T. Ely and F. T. Brown showed a muco-purulent discharge from the right ear, partial loss of the membrana tympani, diminished calibre of the auditory canal, no swelling or redness behind the auricle, *no tenderness on pressure or percussion over the mastoid*, inability to hear a watch on contact, tuning-fork heard but by aerial conduction. The sole cause of his coming to the hospital, was great pain at a point along the right superior curved line, two centimetres from the occipital protuberance; occasionally radiating along the right border of the parietal suture over the frontal bone to its interior angular process; thence above and below the orbit.

Previous history.—No direct injury, but had a fall on back of head one month before. Had never had syphilis; was perfectly temperate, and had always been well until the fourth of last June, when he experienced gradually increasing pain in the right ear. Morphine gave temporary relief. Five days after, a discharge appeared. The pain continuing, a blister was applied behind the ear, and on June 16th, he was able to go to work, but returned in a few hours with still greater pain. For the three weeks following, morphine (hypodermically) was given twice daily; this failing, chloroform inhalation was resorted to. Late in July, Wilde's incision was made

at the New York Eye and Ear Infirmary, but the pain became, almost at once, more intense. A few days later a bone-operation was proposed, but the patient's family objecting, he came with a letter from his physician to the Manhattan Eye and Ear Hospital. Here careful watching for two days and nights verified his story of pain, sleeplessness, and loss of appetite, but no abnormal temperature was detected.

The result of a consultation was to defer operation until thorough anti-neuralgic treatment had been tried. Quinine, alcohol, and galvanism were ordered. Five days later the patient was no better, and perforation of the mastoid was determined upon despite the absence of satisfactory local symptons. It was performed by myself under the advice of Dr. Ely. The periosteum was healthy, and on its section the bone presented a similar appearance. Brainerd's drill sunk one and a half centimetres, entered a cavity, when about four grammes of pus came away. A warm solution of boracic acid, thrown into the *meatus auditorius*, found exit through the wound, bringing pus. The dressing was antiseptic and directed to favor free drainage and prevent occlusion. Pain was at once and permanently removed. Two weeks later the patient went home, but returned daily for dressing. The discharge now amounted to three grammes in twenty-four hours, and a watch could be heard on contact. On the evening of November fourth pain was felt about the auricle, followed by a chill with subsequent fever; the pain prompted a vigorous application of camphorated oil. Toward morning the patient vomited. I was sent for the following night when I found him with a pulse of 90; temperature, 103°; tongue coated; bowels constipated; pupils normal in response to light. Probe passed readily, but the discharge was slight. The tissues about the wound and over the parotid region were œdematous and but slightly sensitive; this pallor suggested serous rather the hæmostatic injection, and might have been either the erysipelatous cause, or the blistering effect, of camphorated oil applied to relieve deeper pain. The diagnosis of erysipelas was made on the fourth day; this disease, still indifferently marked, had extended to the left malar bone; pulse was 98; temperature, 103⅘°; delirious through the night; sight was indistinct; had convergent squint; pupils responded feebly to light; had moderately rhythmic vibrations of the right forearm. I was again led to doubt the absence of meningitis, and called Doctor Roosa in consultation, who, on examination, found

slight cerebral impairment and homonymous double vision existing; the ocular media were clear. Optic discs not seen on account of want of illumination. The mastoid perforation was free, and afforded no evidence of retained pus, although the discharge was greatly diminished. For this reason Doctor Roosa and myself concluded that meningitis due to adjacent suppurative mastoid disease did not exist, and that the diplopia, with other nervous symptoms, was due to a peripheral hyperæmia of the pia mater, by continuity of tissue with the facial erysipelas, resulting in irritation of the sixth nerve at its point of exit.

This belief proved to be correct, for the intensity of the symptoms subsided, and in eight days convalescence began. The discharges from both channels had ceased, and one week later the wound completely closed. This was an agreeable surprise, for in its relationship to disease of the mastoid, I viewed the erysipelas as analogous to epididymitis succeeding a gonorrhœa, and I expected a return of the discharge as the erysipelas subsided.

It seems to me that there are three points of interest in this case:

1. The entire absence of tenderness, heat, or swelling over the suppurating mastoid, while there was a constant pain referred to a point near the occipital protuberance.

2. The difficulty in differentiating the symptons of facial erysipelas from those of meningitis.

3. The direct suggestion made by the case, of the value of active counter-irritation in the treatment of subacute or chronic suppuration of the middle ear.

PEDUNCULATED BONY GROWTH IN EXTERNAL AUDITORY CANAL, THE RESULT OF LONG-CONTINUED SUPPURATION; REMOVAL BY SNARE; MICROSCOPIC EXAMINATION.

By DAVID C. COCKS, M.D., New York.

Mr. S., æt. twenty-eight, clerk, was sent to me by Dr. A. N. Brockway, Nov. 5, '82. Patient states that twelve years ago he had earache; ear lanced by Dr. Packard. Otorrhœa, which followed with short intermissions, continued to date. He has noticed, and could feel with his finger, the growth for which he now seeks advice, for the past seven years, and during that time it has not altered much in size. He has had severe pain in that ear repeatedly, and at the present time is suffering more intensely than usual. Shaking the head during the attacks of pain was followed by a slight discharge of pus. Examination shows the external meatus of the left ear filled by a polypus. A fine probe can, with care, be insinuated between the growth and the canal for ¾″, except backward, where an obstruction is met about ¼″ from the meatus. The growth was covered with a moist mucous membrane. When the probe was withdrawn a drop of fetid pus escaped. The patient being very nervous, ether was administered, and the wire of Blake's snare placed around the growth, and it was then that a suspicion of the growth not being an ordinary polypus was first formed, for the wire loop on being drawn tight did not readily sever the polypus from its base. Steady traction was then made, and the growth suddenly came out, having been severed from its base while the wire still tightly encircled it. The pedicle, broad and short, was situated on the posterior wall of the external canal, about at the junction of the bony and cartilaginous portions. On examining the growth, a facet was

noticed at the inner end, and inspection revealed a small polypus situated in the middle ear (the membrana tympani having been destroyed). This, after the bleeding was controlled, was seized with forceps and removed.

A microscopic examination of the growth by Dr. J. L. Minor, Microscopist to the N. Y. Ear and Eye Infirmary, showed it to be an osseous polypus. The polypi were placed in a bottle and left for two months. At the end of that time the investing mucous membrane had disappeared, and the extent of the bony change was then first seen. The growth was smaller only by the loss of its external membrane. It was white, hard, and gave forth a *click* characteristic of bone when touched by a probe.

DR. MINOR'S REPORT.

The macroscopic appearance of the two bony tumors is well shown in the accompanying cuts (see figs. 1 and 2), which

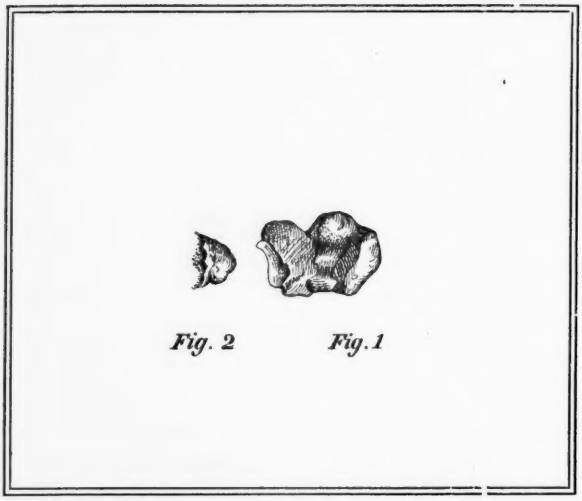


Fig. 2 *Fig. 1*

represent the real sizes. The larger one is an irregular cylindrical mass, with a convex upper surface of comparative smoothness, an irregular, nodulated under surface, a roundish outer extremity, and a smooth articular concavity on its inner end. Its measurements are: length, 15 *mm.*;

breadth, 10 *mm.;* thickness, 7 *mm.* The smaller tumor is an irregular prismatic mass, on the outer surface of which is a smooth convex articular surface, corresponding to the concavity of the larger bone. Its measurements are: transverse, 6.5 *mm.;* longitudinal, 3.5 *mm.;* vertical, 4.5 *mm.:* weight of larger, 0.8*;* smaller, 0.1 gramme.

Both tumors are hard and bone-like, and each is covered by a dense periosteum-like membrane, which closely adheres to the smooth surfaces, and is torn and irregularly attached to the rough surfaces.

Microscopic examinations were made from dried and hardened specimens, consequently the structure of the membrane was not seen. The substance of the tumors, however, leaves no doubt of its nature, for the entire mass consisted of perfectly formed bone-tissue, with beautifully marked Haversian systems, as is shown in fig. 3, which

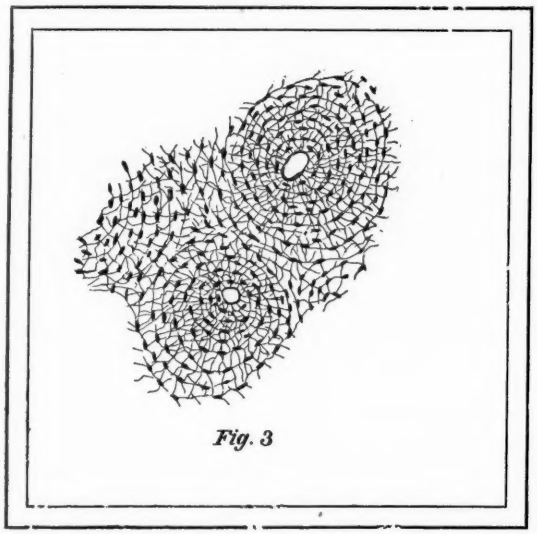


Fig. 3

was drawn from a section ground to extreme thinness. These osteomata undoubtedly arose from masses of granulation tissue, which were associated with the inflammation of the middle ear. Osteoblasts from denuded bone, falling upon granulations, found a nidus for growth and reproduction. This accounts for the ossification; and to

explain the separate bones with articulating surfaces, we may suppose the ossification to have been in two contiguous granulation masses, motion between which was furnished by the movements of the canal, incident upon motion at the temporo-maxillary articulation.

The subsequent history is as follows: The whole canal was syringed twice daily with a saturated solution of boracic acid; and with the exception of a slight erysipelatous attack involving the pinna and surrounding tissues, which lasted four days, the case progressed steadily toward a cure.

The syringing with boracic acid was continued morning and evening. After drying the canal thoroughly, the whole canal was tightly packed with absorbent cotton. The base of the growth dried up, the discharge diminished, a new membrane gradually formed, and by November 27, 1882, all discharge had ceased.

Politzer's method of inflation was practised daily, and on December 1st the hearing power was as follows: L E $\frac{50}{50}$, R E $\frac{60}{50}$.

There is now a membrane which can be made to move backward and forward when air is alternately forced in and out of the canal through a Siegle's speculum, and the hearing on this side is above the standard.

February 10, 1883, L E $\frac{70}{50}$; R E $\frac{60}{50}$.

I have been induced to place this case on record because of the rarity of polypi which have undergone bony metamorphosis.

NOTE.—In the text-book of the "Diseases of the Ear," by Dr. Adam Politzer, translated by Dr. J. P. Cassells, of Glasgow, edition of 1883, published by Henry C. Lea's Son & Co., Philadelphia, reference is made, on p. 639, to this subject. Isolated ossification (Cassells) and calcification of aural polypi are rare, and on p. 618 he speaks of pedunculated exostoses, but his examples are not like the case reported.

THE EXAMINATION OF EARS BY MEANS OF THE TUNING-FORK.

By J. B. EMERSON, M.D., of New York City.

AT the suggestion of Dr. St. John Roosa, I began, more than a year ago, some investigations of tuning-fork tests, as applied to ears with normal hearing. The results which I have obtained seem to me sufficiently interesting to be submitted to the profession.

Over one hundred persons with normal hearing were tested somewhat superficially, and the results were *uniformly similar*. I then made fifty of these cases the subject of very careful testing, and I have tabulated the result with a view to their study. The standard of hearing was a watch, heard at forty inches and over. I found that at least two thirds of those who supposed their hearing was normal failed to come up to this standard. The hearing of some, however, was so acute that they perceived the ticking at fifty, sixty, seventy, and one at eighty inches. No allowance has been made for this excess, but all such cases have been entered in the table as $\frac{40}{40}$.

The fifty cases include persons of a great variety of conditions in life, of both sexes, and they range in age from seven to sixty years. Some of the tests were made in comparative quiet, others amidst the noises of a hospital clinic; I hoped by testing in this way to get an average which might be useful in all circumstances. This is to be taken into account as one of the factors that may explain the absolute differences of duration in the tabular statement. Another

cause for this difference is that my tuning-forks did not vibrate as long after extended use as they did when new; and my A fork finally snapped when subjected to a strain which it had resisted hundreds of times. It is thus seen that the steel in tuning-forks, like that in railroad use, deteriorates from continued vibration. The note, however, remained unchanged to the last. A third factor to explain the absolute difference of duration is the inability of some persons to keep their attention fixed, or to appreciate the more delicate shades of the test. This is especially the case in uncultivated and ignorant persons.

The forks used were: 1st. A fork 32½ *cm.* long, with cylindrical prongs and handle, giving a note more than an octave below the middle C (middle C is $c^1 = 264$ double vibrations according to Helmholtz), and called A (110 double vibrations, H.). 2d. Another fork about 17 *cm.* long, with rectangular prongs and conical handle, giving a note one octave above middle C and called c^2 (according to Helmholtz $c^2 = 528$ vibrations).

In using the forks, I have endeavored to obtain a uniform strength of vibration, striking them on my knee and holding them in corresponding positions for each individual: for aërial conduction about half an inch in front of the concha, and moving continuously to avoid exhaustion and the "deaf spots"; for bone-conduction, the end of the handle of the fork at the junction of the mastoid and squamous portion of temporal bone just behind the ear.

In determining the duration, I struck the fork at an exact five or ten seconds of the watch, and noted the time to the nearest five seconds when the patient ceased to hear the sound; the question being asked, "which is *louder*, through bone or through air?" and answer noted.

While I can only claim approximate results, I think I am justified in believing that all grosser sources of error have been avoided; and for practical purposes the results may be regarded as fairly representing the average.

From a tabulated statement (which for brevity's sake is here omitted) of the fifty cases, the following results were obtained:

In every case the A fork was *louder* when heard through *bone*, and the c^2 fork, when heard through *air*.

The average *duration* in seconds was as follows :

A fork	
Air-conduction	31
Bone-conduction	18
Excess in air-conduction	13
c^2 fork	
Air-conduction	36
Bone-conduction	16
Excess in air-conduction	20
A and c^2 forks	
Air-conduction	34
Bone-conduction	17
Excess in air-conduction	17

A and c^2 are both heard *longer* through aërial than through bone-conduction.

The difference between air- and bone-conduction is less for the A note than for the c^2 note; A being heard about 1.75 times longer through *air* than through *bone*; while c^2 was heard about 2.25 times longer through *air* than through *bone*.

For both A and c^2, the average duration is twice as long through the air as it is through the bone.

Several months since I began to apply the same tests to persons who had disease of the middle ear; and I have also tabulated the results for the following fifty cases.

No.	Disease.	Age.	Hearing Distance.	Which is louder, Air- or Bone-Conduction?	Duration of Air-Conduction, in seconds.	Duration of Bone-Conduction, in seconds.	Excess of Air- over Bone-Conduction.	Excess of Bone- over Air-Conduction.
1	Ot. med. cat. subacute	36	R = 24/40	A.[1] Bone.	10	15		5
				C.[1] Bone.	20	20		
	Cicatric. *Mt*. . . .		L = 2/40	A. Bone.	0	20		20
				C. Bone.	20	15	5	
2	Ot. med. cat. chron. .	26	R = 15/40	A. Bone.	15	10	5	
				C. Air.	20	10	10	
	Cicatric. *Mt*. . . .		L = 4/40	A. Bone.	5	10		5
				C. Air.	10	15		5
3	Ot. med. cat. chron. .	50	R = 1/40	A. Bone.	10	15	5	5
				C. Bone.	30	20	10	
			L = 18/40	A. Bone.	12	15		3
				C. Air.	30	20	10	
4	Ot. med. sup. chron. .	16	R = 12/40	A. Bone.	10	10		
				C. Air.	15	10	5	
	Ot. med. cat. chron. .		L = 20/40	A. Bone.	15	10	5	
				C. Air.	25	15	10	
5	Ot. med. cat. acute—2 days	24	R = 18/40	A. Bone.	20	10	10	
				C. Air.	30	15	15	
			L = C/40	A. Bone.	20	10	10	
				C. Air.	30	15	15	
6	Ot. med. sup. chron. .	12	R = 12/40	A. Bone.	10	20		10
				C. Bone.	30	20	10	
			L = 14/40	A. Bone.	10	15		15
				C. Bone.	30	15	15	
7	Ot. med. cat. chron. .	28	R = 1/40	A. Bone.	15	15		
				C. Bone.	10	10		
			L = 3/40	A. Bone.	15	5	10	
				C. Air.	10	25		15
8	Ot. med. cat. acute. .	34	R = 30/40	A. Bone.	30	15	15	
				C. Air.	15	10	5	
			L = 18/40	A. Bone.	30	25	8	
				C. Air.	20	10	10	
9	Ot. med. cat. chron. .	35	R = 5/40	A. Bone.	5	20		15
				C. Bone.	20	25		5
			L = 8/40	A. Bone.	10	20		10
				C. Bone.	15	20		5

[1] A. means A fork = 110 vibrations. C. means c^2 fork = 528 vibrations.

No.	Disease.	Age.	Hearing Distance.	Which is louder, Air- or Bone-Conduction?	Duration of Air-Conduction, in seconds.	Duration of Bone-Conduction, in seconds.	Excess of Air- over Bone-Conduction.	Excess of Bone- over Air-Conduction.
10	Ot. med. sup. chron. .	23	R = 0/40	A. Bone.	0	2		2
				C. Bone.	0	5		5
			L = 30/40	A. Bone.	10	10		
				C. Air.	20	10	10	
11	Ot. med. cat. chron. .	44	R = 30/40	A. Bone.	15	15		
				C. Air.	20	10	10	
			L = 20/40	A. Bone.	10	15		5
				C. Air.	20	10	10	
12	Ot. med. sup. chron. .	50	R = 0/40	A. Bone.	0	5		5
				C. Bone.	5	10		5
			L = P/40	A. Bone.	5	10		5
				C. Bone.	5	10		5
13	Ot. med. sup. chron. .	18	R = 20/40	A. Bone.	10	10		
				C. Bone.	25	15	10	
			L = 2/40	A. Bone.	0	10		10
				C. Bone.	10	15		5
14	Ot. med. cat. chron. .	38	R = 1/40	A. Bone.	10	30		20
				C. Bone.	10	15		5
			L = 8/40	A. Bone.	10	30		20
				C. Bone.	5	15		10
15	Ot. med. cat. chron. .	50	R = C/40	A. Bone.	0	10		10
				C. Bone.	5	10		5
			L = 4/40	A. Bone.	15	15		
				C. Air.	20	25		5
16	Ot. med. cat. chron. .	55	R = P/40	A. Bone.	5	15		10
				C. Bone.	5	15		10
			L = 0/40	A. Bone.	5	10		5
				C. Bone.	5	15		10
17	Ot. med. sup. chron. .	23	R = 0/40	A. Bone.	0	10		10
				C. Bone.	0	10		10
			L = 24/40	A. Bone.	10	10		
				C. Air (?)	15	10	5	
18	Ot. med. cat. chron. .	25	R = 8/40	A. Bone.	5	10		5
				C. Bone.	10	15		5
			L = 6/40	A. Bone.	5	10		5
				C. Bone.	5	5		

No.	Disease.	Age.	Hearing Distance.	Which is louder, Air- or Bone-Conduction?	Duration of Air-Conduction, in seconds.	Duration of Bone-Conduction, in seconds.	Excess of Air- over Bone-Conduction.	Excess of Bone- over Air-Conduction.
19	Ot. med. cat. chron. .	20	R = 3/40	A. Bone.	10	15		5
				C. Bone.	15	25		10
			L = 2/40	A. Bone.	5	15		10
				C. Bone.	15	25		10
20	Ot. med. cat. subacute	30	R = 8/40	A. Bone.	15	15		
				C. Bone.	20	15	5	
			L = 1/40	A. Bone.	15	10	5	
				C. Bone.	15	5	10	
21	Ot. med. cat. chron. .	34	R = 16/40	A. Bone.	10	10		
				C. Air.	15	10	5	
			L = C/40	A. Bone.	15	15		
				C. Air.	20	15	5	
22	Ot. med. sup. chron. .	20	R = 12/40	A. Bone.	10	15		5
				C. Bone.	15	15		
			L = 2/40	A. Bone.	0	15		15
				C. Bone.	10	15		5
23	Ot. med. cat. chron. .	47	R = P/40	A. Bone.	10	15		5
				C. Bone.	10	15		5
			L = 2/40	A. Bone.	5	10		5
				C. Air.	10	10		
24	Ot. med. sup. chron. .	16	R = 2/40	A. Bone.	0	10		10
				C. Bone.	10	25		15
			L = 20/40	A. Bone.	15	15		
				C. Air.	20	30		10
25	Ot. med. cat. chron. .	26	R = 8/40	A. Bone.	0	15		15
				C. Bone.	10	15		5
			L = 8/40	A. Bone.	0	10		10
				C. Bone.	5	10		5
26	Ot. med. cat. chron. .	23	R = 4/40	A. Bone.	10	10		
				C. Bone.	20	15	5	
			L = 2/40	A. Bone.	10	5	5	
				C. Air.	20	10	10	
27	Ot. med. cat. chron. .	10	R = 2/40	A. Bone.	15	15		
				C. Air.	20	20		
			L = 12/40	A. Bone.	10	10		
				C. Air.	15	15		

No.	Disease.	Age.	Hearing Distance.	Which is louder, Air- or Bone-Conduction?	Duration of Air-Conduction, in seconds.	Duration of Bone-Conduction, in seconds.	Excess of Air- over Bone-Conduction.	Excess of Bone- over Air-Conduction.
28	Ot. med. sup. chron. .	19	R = $\frac{0}{40}$	A. Bone.	0	15		15
				C. Bone.	10	15		5
			L = $\frac{20}{40}$	A. Bone.	5	15		10
				C. Bone.	25	20	5	
29	Ot. med. sup. chron. .	30	R = $\frac{12}{40}$	A. Bone.	5	15		10
				C. Air.	30	20	10	
			L = $\frac{0}{40}$	A. Bone.	0	10		10
				C. Bone.	10	10		
30	Ot. med. sup. chron. .	28	R = $\frac{20}{40}$	A. Bone.	10	30		20
				C. Bone.	10	25		15
			L = $\frac{10}{40}$	A. Bone.	15	30		15
				C. Bone.	15	35		20
31	Ot. med. sup. chron. .	20	R = $\frac{4}{40}$	A. Bone.	10	20		10
				C. Bone.	15	35		20
			L = $\frac{12}{40}$	A. Bone.	15	35		20
				C. Bone.	15	40		25
32	Ot. med. sup. chron. .	16	R = $\frac{C}{40}$	A. Bone.	0	25		25
				C. Bone.	10	15		5
			L = $\frac{0}{40}$	A. Bone.	0	30		30
				C. Bone.	0	20		20
33	Ot. med. cat. chron. .	13	R = $\frac{C}{40}$	A. Bone.	10	20		10
				C. Bone.	15	15		
			L = $\frac{2}{40}$	A. Bone.	10	20		10
				C. Bone.	15	15		
34	Ot. med. cat. chron. .	65	R= n. or 1′	A. Bone.	0	15		15
				C. Air.	20	15	5	
			L=n. at 1′	A. Bone.	0	20		20
				C. Air.	20	15	5	
35	Ot. med. cat. chron. .	35	R = $\frac{12}{40}$	A. Bone.	10	15		5
				C. Air.	15	10	5	
			L = $\frac{14}{40}$	A. Bone.	10	10		
				C. Air.	15	15		
36	Ot. med. cat. chron. .	34	R = $\frac{C}{40}$	A. Bone.	15	20		5
				C. Air.	20	15	5	
			L = $\frac{12}{40}$	A. Bone.	10	20		10
				C. Air.	20	15	5	

No.	Disease.	Age.	Hearing Distance	Which is louder, Air- or Bone-Conduction?	Duration of Air-Conduction, in seconds.	Duration of Bone-Conduction, in seconds.	Excess of Air- over Bone-Conduction.	Excess of Bone- over Air-Conduction.
37	Ot. med. sup. chron. .	17	R = 10/40	A. Bone.	5	40		35
				C. Bone.	15	45		30
			L = 4/40	A. Bone.	5	35		30
				C. Bone.	15	40		25
38	Ot. med. sup. chron. .	37	R = 4/40	A. Bone.	5	20		15
				C. Bone.	15	15		
			L = 0/40	A. Bone.	0	15		15
				C. Bone.	10	15		5
39	Ot. med. sup. chron. .	17	R = 6/40	A. Bone.	5	25		20
				C. Bone.	5	15		10
			L = 20/40	A. Bone.	30	30		
				C. Air.	35	25	10	
40	Ot. med. sup. chron. .	47	R = 15/40	A. Bone.	15	25		10
				C. Air.	20	20		
			L = 18/40	A. Bone.	10	25		15
				C. Air.	20	20		
41	Ot. med. sup. chron. .	16	R = 2/40	A. Bone.	10	25		15
				C. Bone.	15	20		5
			L = 20/40	A. Bone.	25	30		5
				C. Air.	25	20	5	
42	Ot. med. sup. chron. .	19	R = 20/40	A. Bone.	15	20		5
				C. Air.	15	10	5	
			L = 0/40	A. Bone.	0	10		10
				C. Bone.	5	10		5
43	Ot. med. cat. chron. .	54	R = 1/40	A. Bone.	15	25		10
				C. Air.	15	15		
			L = C/40	A. Bone.	25	20	5	
				C. Air.	25	20	5	
44	Ot. med. sup. chron. .	12	R = 12/40	A. Bone.	10	20		10
				C. Bone.	15	25		10
			L = 6/40	A. Bone.	10	25		15
				C. Bone.	20	20		
45	Ot. med. sup. chron. .	13	R = 14/40	A. Bone.	15	35		20
				C. Bone.	20	25		5
			L = 8/40	A. Bone.	10	35		25
				C. Bone.	20	25		5

No.	Disease.	Age.	Hearing Distance	Which is louder, Air- or Bone-Conduction?	Duration of Air-Conduction, in seconds.	Duration of Bone-Conduction, in seconds.	Excess of Air- over Bone-Conduction.	Excess of Bone- over Air-Conduction.
46	Ot. med. cat. subacute	49	R = $\frac{P}{40}$	A. Bone.	20	20		
				C. Bone.	20	15	5	
			L = $\frac{P}{40}$	A. Bone.	15	15		
				C. Bone.	20	15	5	
47	Ot. med. cat. chron. .	23	R = $\frac{15}{40}$	A. Bone.	10	30		20
				C. Bone.	15	20		5
	Ot. med. sup. chron. .		L = $\frac{C}{40}$	A. Bone.	5	20		15
				C. Bone.	10	20		10
48	Ot. med. sup. chron. .	9	R = $\frac{P}{40}$	A. Bone.	15	20		5
				C. Bone.	20	20		
	Ot. med. cat. chron. .		L = $\frac{20}{40}$	A. Bone.	25	25		
				C. Air.	30	30		
49	Ot. med. cat. chron. .	23	R = $\frac{15}{40}$	A. Bone.	15	20		5
				C. Air.	20	15	5	
			L = $\frac{20}{40}$	A. Bone.	15	20		5
				C. Air.	20	15	5	
50	Ot. med. sup. chron. .	32	R = $\frac{0}{40}$	A. Bone.	0	2		2
				C. Bone.	0	2		2
			L = $\frac{0}{40}$	A. Bone.	0	5		5
				C. Bone.	0	5		5

In every case the patient asserted that A was much louder through the bone than through the air. In 39 ears the c^2 was heard louder through air; in the remaining 61 ears it was heard louder through the bones. The middle C (c^1 Helmholtz) tuning-fork was used in some of the "39" ears; with it the sound was heard longer through the bone. In 26 of the 39 ears the hearing was $\frac{12}{40}$ and over.

Average duration, in seconds, for 26 ears:

A. Air-conduction	15
Bone- "	17
Excess of bone-conduction	2

Bone-conduction heard 1.13 longer than aërial conduction.

c^2. Air-conduction	21
Bone- "	15
Excess air-conduction	6

Aërial conduction heard 1.4 longer than bone-conduction.

A and c^2. Air-conduction	18
Bone-conduction	16
Excess air-conduction	2

Aërial conduction is heard 1.13 longer than bone-conduction.

In 13 of the 39 ears the hearing was $\frac{4}{40}$ and under.

Average duration, in seconds, for 13 ears:

A. Air-conduction	12
Bone- "	14
Excess bone-conduction	2

Bone-conduction heard 1.16 longer than aërial conduction.

c^2. Air-conduction	18
Bone- "	17
Excess air-conduction	1

Aërial conduction 1.05 longer than bone-conduction.

A and c^2. Air-conduction	15
Bone-conduction	15

Equal.

In 61 ears, in which the c^2 tuning-fork was heard louder through bone, the average duration was:

A. Air conduction	7
Bone- "	18
Excess bone-conduction	11

Bone-conduction heard 2.57 longer than aërial conduction.

c^2. Air-conduction	12
Bone "	18
Excess bone-conduction	6

Bone-conduction 1.5 times longer than aërial conduction.

A and c^2. Air-conduction	10
Bone-conduction	18
Excess bone-conduction	8

Bone-conduction heard 1.8 longer than aërial conduction.

Average duration, in seconds, for the entire 100 *ears :*

A. Air-conduction	10
Bone "	17
Excess bone-conduction	7

Bone-conduction 1.7 longer than aërial conduction.

c^2. Air-conduction	16
Bone "	17
Excess bone-conduction	1

Bone-conduction 1.06 longer than aërial conduction.

A and c^2. Air-conduction	13
Bone-conduction	17
Excess bone-conduction	4

Bone-conduction 1.3 longer than aërial conduction.

From a study of the foregoing table the **following conclusions** seem to be reached :

1st. Relying on the statements of patients in regard to the *loudness* of tuning-forks, as a test in ear troubles, will lead to error unless account is taken of the fork used. As a rule, in normal ears high notes are heard louder through aërial conduction, and low notes louder through bone-conduction. This is true also, to a limited extent, in diseased ears, as verified by the thirty-nine cases cited.

2d. The relative duration of aërial and bone-conduction is a better test. In normal ears, in all cases the tuning-fork is heard *longer* through air than through bone, the proportion being greater for high than low notes ; and for the *middle* C (c^1) it should be heard about twice as long through air as through bone, the average duration in

my cases being for bone seventeen seconds, and for air thirty-four seconds. Any *marked* departure from this indicates disease.

3d. In external- or middle-ear disease this proportion is reduced, and in well-marked cases the average bone-conduction remaining the same or being increased, the aërial conduction will be reduced until it becomes equal to or much less than bone-conduction. In one hundred ears tested, the average duration was for bone seventeen seconds, for air thirteen seconds, or 1.3 longer through bone than air. This reduction obtained also in the thirty-nine cases in which air-conduction was louder than bone-, the average duration in those ears being equal.

4th. When the bone-conduction is longer than aërial conduction, and yet much less than the average duration of bone-conduction for normal ears, it is an indication not only of middle-ear trouble, but that the nervous apparatus is involved. Case 50, in the foregoing table is an illustration of this.

5th. If the proportion between bone and air remain the same, and the hearing power much lowered, it is probably an indication of disease of the internal ear. Air-conduction markedly exceeding bone-conduction the bone-conduction may be entirely lost, and yet air-conduction continue to a limited extent.

The two following cases illustrate this.

Case 1. Mr. ———, forty-five. Chronic alcoholism.

		D. air.	D. bone.
H R = $\frac{8}{40}$	A bone	30	20
	c ² air	45	25
H L = $\frac{8}{40}$	A bone	30	15
	c ² air	40	15

Case 2. Mr. ———, twenty-three. Meningitis.

		D. air.	D. bone.
H R = $\frac{3}{40}$	A bone	10	3
	c ² air	25	5
H L = $\frac{2}{40}$	A bone	10	5
	c ² air	25	10

Average duration, in seconds :

A and c^2

Air-conduction	27
Bone "	12
Excess air-conduction	13

Aërial conduction is heard 2.25 times longer than bone-conduction.

Before closing I would acknowledge my indebtedness to Drs. Roosa and Pomeroy for the use of their clinics at the Manhattan Eye and Ear Hospital.

TWO CASES OF SYPHILITIC DISEASE OF THE LABYRINTH, WITH REMARKS.*

By DAVID WEBSTER, M.D., New York.

THESE two cases are selected from a number of cases of syphilitic disease of the ear, occurring in the practice of Dr. C. R. Agnew and myself, for presentation to this Society, because the records of them are reasonably complete, and because of the interest that has been manifested in this class of affections during the last few years.

The diagnosis of labyrinth disease was based in both cases upon the total, or almost total, deafness of the affected ear to external sounds, and to the tuning-fork. In the first case there may be room for question as to the diagnosis.

The autophony, the patient's voice "sounding to himself as though he were talking into a barrel," seems to be a symptom of middle-ear disease. But the absence of all abnormal appearances of the membrana tympani, and the inability of the patient to hear the tuning-fork in the deaf ear while he heard it well in the other, as also the suddenness with which the deafness was ushered in, seemed to render the existence of labyrinth disease extremely probable.

In the second case, I think the most sceptical will not question the diagnosis.

The cases are both remarkable, I think, on account of the recovery of hearing, which occurred after months of total deafness. What the specific lesion of the labyrinth was which produced the deafness I am unable to say. It may

* Read before the N. Y. State Medical Society, Feb. 6, 1883.

have been congestion, or it may have been inflammation, or it may have been a periosteal thickening similar to that affecting the orbital walls in the second case. Possibly, some one who has given more thought to this subject than I have may, on reading the cases, be able to arrive at a more positive conclusion as to the nature of the lesion.

In the first case only one ear was affected throughout the course of the disease. This ear either became suddenly deaf, or else its hearing was gradually lost without attracting the attention of the patient, until he accidentally made the discovery. It remained totally deaf, or nearly so, for several months, when, under antisyphilitic treatment, the hearing was gradually recovered, and there has been no relapse up to the present time.

In the second case, one ear became deaf and remained so for several months, when it gradually recovered its hearing, and retained it for nearly a year, when the patient awoke one morning with the same ear again totally deaf. After some months' treatment the hearing was partially recovered, but, soon after, the patient turned up "deaf as a post" in both ears. He is still totally deaf in the ear first affected, and probably will always remain so. The hearing of the other ear was so far recovered under treatment that he hears conversation readily.

In the second case a great deal of vertigo is complained of. In the first case there was none.

CASE I.—May 27, 1874. O. W., aged forty-one, physician, says that he had what some of the most prominent physicians in New York diagnosticated as pulmonary tuberculosis, at the age of twenty-five. The pulmonary disease was a sequel of measles, and was accompanied by copious and frequent hæmoptysis.

After physicians and friends had given him up, he gradually recovered under a very free use of whiskey, and an out-of-door life.

Four months ago, he had an attack of irregularity of heart-action, following extreme exhaustion from extraordinary loss of sleep in attending to his professional duties. The action of the heart was tumultuous, irregular; now rapid, now slow; at times fluttering, and again intermittent. The attack lasted thirty hours and did not recur.

For the last three months he has suffered from intermittent fever, with neuralgia. He has severe headaches every night, coming on at 9 or 10 o'clock, and continuing all night, keeping him awake for hours at a time. These neuralgic pains have frequently been felt in both his ears, and about three weeks ago he discovered, for the first time, that his left ear was totally deaf. He has since experienced a very annoying ringing in the affected ear, and a very little pain.

Hearing power: right, normal; left, click of nails at three inches.

Tuning-fork, on teeth or forehead, heard only in right ear.

Pharynx slimy.

Auditory canals and membranæ tympanorum, normal.

Eustachian tubes easily opened by Valsalva's method.

His voice, which to others seems normal, sounds to himself as though he were talking into a barrel.

As the history seemed to point to malarial poisoning as the cause of his troubles, it was suggested to the patient that he should put himself upon large doses of quinine. This he objected to, however, because the drug had always acted very unpleasantly upon his nervous system. He believed that five grains would set him crazy. He was, therefore, placed upon a mixture containing chinoidin, arsenic, and strychnia. He was advised to drink half a pint of milk four times daily, not to do any night work, and to rest for an hour or two, regularly, at noon.

July 1st.—The patient now recollects that about three months ago he had an ulcer on the back of his neck. From six weeks to two months he has had tibial periostitis, and tender spots on each ulna. The neuralgic pains continue. The hearing of the left ear has slightly improved, the click of nails now being heard at three feet. The patient was now placed upon iodide of potassium, in increasing doses, with cod-liver oil.

July 15th.—No headache; no neuralgic pains. Has slept well for the last eight or ten nights. Some tibial tenderness remains. The left ear hears the watch in contact, and the voice as in ordinary conversation, at ten feet. There is less tinnitus aurium.

July 28th.—Has had ulcers on velum for the last ten days, but they are now nearly well from cauterizing with nitrate of silver. The left ear now hears the watch at a quarter of an inch.

Aug. 25th.—Mucous patches and ulcers on tongue, lips, and buccal mucous membrane. The left ear hears the watch at one and a half inches.

The patient was now advised to place himself under the care of Dr. F. J. Bumstead.

I complete the history of the case by the following extract from a letter from the patient, dated May 8, 1879, about five years after we first saw him :

"I am very happy to inform you that my general health is now first-rate. I can hear a watch tick at arm's length with my left ear, but not quite so clearly as with my right. It does not trouble me, however, in any way whatever, and my left ear is just as good as my right for purposes of auscultation. For ordinary conversation, practically the left ear is as perfectly good as the right, and I can hear ordinary conversation quite as well as before my left ear became deaf. You will doubtless recollect that the last time I saw you I had mucous patches in my mouth and throat in large numbers. Dr. Bumstead at once placed me upon blue mass and iron, which, together with potass. iodide, I continued to take for two years, taking from six to ten grains of blue mass with half that quantity of ferri sulph. daily ; at one time taking this for nearly a year without intermission. I had returns of the mucous patches, ulceration of fauces and soft palate, and had, two or three times, ulceration of the epiglottis, which was very nearly destroyed, the disease proving very obstinate and unyielding. During the last year that I took it, I took not less than six ounces of the blue mass. Since that time I have had no manifestation of the disease whatever, and have taken no medicine. During all the treatment I never became salivated, and no physiological effects whatever were shown. My health is now as perfectly good in every way as ever, and I may say my hearing is perfectly restored. I consider mine as a typically bad case with a typically good result. No doubt exists in my mind that had I neglected treatment, or followed it carelessly, the disease would have caused my death."

Case 2.—B. M., aged 43, druggist, came under observation in January, 1878. He stated that he had contracted syphilis while in the army in 1862. The chancre was followed by an eruption, and some loss of hair, but no sore throat or enlargement of glands. He had nocturnal pains in his left shoulder, disturbing his sleep, for a year, on returning from the war. His left shin was then tender and painful for over a year. An ulcer appeared on his sternum in 1863. There are now eight sores over his sternum, with evidences of necrosis. Six months ago the right eye began to pro-

trude, and there is now very marked exophthalmos. There is no diplopia, and the eye moves freely in every direction. Vision $\frac{20}{20}$ each eye, and no lesion to be seen with the ophthalmoscope. The exophthalmos seems to be the result of orbital periostitis.

The right ear became deaf gradually about four months ago. It now seems to be totally deaf to external sounds, not even hearing the tuning-fork when applied to the forehead or teeth, but hears a constant singing. The hearing of the left ear is normal. There is no visible lesion of the external or middle ear on either side, and the Eustachian tubes are pervious. The patient has much vertigo, feeling at times as though he were walking like a drunken man.

He was placed upon mercurial inunction.

Feb. 19th.—The gums were "touched," and the mercurial ointment was discontinued about a week ago. There is less tinnitus, and the ear is recovering its hearing.

The patient was now placed upon a saturated solution of iodide of potassium, commencing with five drops three times daily, and increasing the dose two drops daily.

March 1st.—The patient says he can hear with his right ear as well as ever, that the ringing has left it, and that he is no longer troubled with vertigo. He is taking seventeen drops of the saturated solution of iodide of potassium after each meal.

Nov. 2d.—The patient has been overworked, and has not slept well for two weeks. He complains of pain in his left elbow and left leg. In both ears the hearing remains normal. The vision of both eyes is normal, and the exophthalmos of the right is no more marked than when first seen. He has been taking iodide of potassium, gr. xx, *ter in die*, all summer. Advised to stop the iodide and resume mercurial inunction.

Feb. 11th, 1879.—The patient awoke a few mornings ago with the right ear again deaf, and the tinnitus as bad as ever. The left arm and leg have not been painful for two months past. The sores on his sternum are gradually healing. The principal trouble now is with the right side of the head. The scalp about the vertex is tender on pressure, and there are shooting pains through the right side of the head. He complains of a dull, heavy feeling, and tires easily. Ordered mercury with iodide of potassium.

Sept. 18th.—The patient now hears the tuning-fork with his right ear, though less than with his left, and he hears click of nails at two inches. The tinnitus is less intense. The drum-membranes

appear normal. The sores on the sternum are nearly healed. The scalp at the vertex is still tender. Walking up stairs fatigues him and causes palpitation. The exophthalmos is no worse, and vision is $\frac{20}{20}$. Ordered blue mass with iron and quinine.

Nov. 26th, 1880.—The patient comes to the office so deaf that he has to be communicated with in writing, and with so much vertigo that he is unable to go about alone. He says that he heard very well with his left ear until he received a blow on the left temple with a car-brake, about two months ago. Some swelling followed, and he soon began to lose the hearing of the left ear. It grew gradually worse until about four days ago, when he became totally deaf and has so remained. He hears a great roaring continually in his left ear. His voice is elevated in pitch. The right ear is absolutely deaf to all tests; the left hears click of nails in contact. The tuning-fork placed againt the forehead or teeth is faintly heard in the left ear. He cannot perceive any improvement with audifan or hearing-tube. Right drumhead sunken, reddened at periphery, and light spot small; left in a similar condition. Eustachian tubes open on using Politzer's method. Advised to push mercurial inunction.

Dec. 3d.—Mouth touched. H D R o., L $\frac{1}{\text{nails}}$ Can now understand sentences shouted into left ear. To take iodide of potassium, gr. v, *ter in die*, and increase the dose two grains daily. Is less dizzy; came over from Jersey City alone to-day. The ulcers of his sternum are not yet healed.

Dec. 23d.—Now hears sentences, uttered distinctly, at ten feet. H D R o, L $\frac{\text{cont.}}{60}$. Has taken up to fifty drops, thrice daily, of a saturated solution of iodide of potassium. Yesterday an iodide eruption appeared. He has a catarrhal discharge from his nose, and is still greatly troubled with tinnitus. To stop the iodide, and to snuff up salt and water every morning. After thus cleansing the nares, he is to apply Smith's powder (arg. nit. gr. v., potas. sulph. ʒ ss., bismuth. subnitrat. ʒ i. ℳ.) by means of a powder-blower. To drink milk freely.

April 9th, 1881.—Patient thinks that he hears better than when last seen, but the usual tests show no change in his hearing.

On January 19, 1883, I asked Dr. J. Oscroft Tansley to make a careful examination of this patient's condition, and he gave me the following notes:

"H D Right=nails at five feet; watch, not at all. The left ear was closed with a towel, yet I cannot but think that the nails were heard in the left ear and not in the right.

"H. D. Left=watch at two and a half inches. Tuning-fork heard only in left ear when placed on middle or extreme right of teeth or forehead. Closing the left, it was heard *only* in the left ear. Closing the right, it was heard *only* in the left ear. Closing both, it was heard *only* in the left ear.

"Tuning-fork, left ear, by aërial conduction, forty-five seconds; by bone conduction, fifteen seconds. The right ear cannot be made to hear the tuning-fork either by aërial or by bone-conduction. The patient says he *feels the vibrations*, but does not hear the sound, with that ear.

"Appearances: Left membrana tympani slightly removed from normal appearance. Malleus drawn slightly backward and a little foreshortened. Light spot slightly cut off on base, but of normal brilliancy. Drumhead not thickened at all, but translucent. Right membrana tympani presents same appearances as left. Malleus not so much, *if any*, foreshortened. Light spot, bright and glistening. Base, perhaps, slightly indistinct; otherwise normal.

"Both membranæ act well under Siegle's tympanoscope.

"Diagnosis: Right, labyrinthine or nervous deafness. Left, otitis media catarrhalis, with labyrinthine complications. Patient has occasional vertigo, with inclination to fall laterally, and a feeling of heavy weight in head. During the time of his total deafness in both ears he experienced singing noises, but has had none since."

A CASE OF CLONIC SPASM OF THE LEVATORES PALATI, PRODUCING A RHYTHMICAL CLICKING NOISE.*

By Dr. CORNELIUS WILLIAMS, of St. Paul, Minn.

LATE ASSISTANT SURGEON AT THE NEW YORK OPHTHALMIC AND AURAL INSTITUTE, SURGEON TO THE OUT-DOOR DEPARTMENT MT. SINAI HOSPITAL, ETC., ETC.

Violetta Z., twelve years old; good frame; full-blooded brunette; weighs ninety-one pounds. She has not yet menstruated, nor are there any menstrual molimina.. Her mother is a French-American, in good health. There are seven children, all living, Violetta being the sixth. The father was a German, well educated, and a talented musician. He was drowned some eight years ago, in a fit of insanity. In the mother's family there have been some cases of Pott's disease. The immediate family and near of kin are all healthy, and of more than average intellectual development. They are all of strongly-marked nervous temperament, and the father was extremely so.

When Violetta was ten years old, having occasion to get up during the night, she lost her way in going back to her bed, and reaching her grandmother's room by mistake, she laid her hands upon the aged lady in the dark, and so alarmed her, and was herself so much frightened by the grandmother's shrieks, that she almost went into convulsions. She refused to return to her own bed, but lay in her sister's arms, starting and sobbing, the night through. Next day she was extremely pale and nervous, nor did she recover her wonted spirits for a number of days. This happened in the spring of 1880, and a short time after this the child discovered that a strange clicking sound was produced in her mouth, but suffering no inconvenience from it she mentioned it to no one. In the June following she fell into Lake Elmo (Minn.),

* Shown at a meeting of the Ramsey Co. Med. Soc. in Jan., 1883.

and came near being drowned, and a short time after this she called the attention of her mother to the clicking, which had now become constant. The family medical attendant was consulted, who pronounced it a common affair; the uvula was cut off entirely, and one tonsil was amputated without result as far as concerned the clicking. The patient is in good general health; appetite and digestion good; sleeps well. She is easily fatigued, but is kept up by any excitement. There has been for the last three years diurnal incontinence of urine, the act of micturition recurring about every half hour, but at night it is hardly ever necessary for her to get up more than twice. Dr. S. W. Hand, who was kind enough to examine her, informs me that there is considerable leucorrhœa, and that the urethra is unusually large and patulous. He explored the bladder and found no evidence of stone. The act of micturition is not painful. Drs. Hand, Boardmann, Abbott, and Wheaton examined her heart at my request, and report that there is nothing abnormal about it.

Upon looking into the patient's mouth, it is perceived that the velum palati is rapidly raised and lowered without being made tense in its entirety. At the moment of relaxation of the levatores a sound is produced which is as much as can be like the ticking of a small brass clock, and in a still room it may be heard at a distance of twenty feet. The clicking corresponds to a complete contraction and relaxation of the levatores palati, and by actual count is 120 a minute, with very little variation in frequency at any time. When the mouth is opened widely, the azygos uvulæ is sometimes seen to contract, but such contraction would seem to be physiological. The tone of the clicking is changed by closing the nose and by otherwise altering the usual conditions of the mouth and nose as to the volume of air contained, but that, or any other manipulation, procures the cessation of the noise or its cause. Laryngoscopic examination shows the larynx to be normal, save a slight congestion. Rhinoscopy is not practicable. Otoscopy reveals the membrana tympani of each ear slightly indrawn, the handle and short process of the malleus of the right being abnormally prominent. Light spot gone from both *Mtt.*

By means of the diagnostic tube, I am able to hear the clicking sound in either of the patient's ears—more distinctly in the right. It may very well be likened to the ticking of a watch under a pillow, or the sound of the fœtal heart. If there is any movement of the membrana tympani, I have not been so fortunate as to ob-

serve it. The girl's voice is natural, and she can sing with correctness, uttering the chest notes without difficulty, but is unable to produce head notes at all. In running the scale, a decided tremolo is remarked. The patient, of necessity, breathes through the mouth, and from habit keeps it open during sleep. When there is tonsillitis, to which she is subject, there is considerable druling. At such times she is apt to have glottic spasm. The spasm of the levatores ceases during sleep. At irregular intervals, perhaps fifty or a hundred times through the day, there is an interrupted spasm of the diaphragm, giving rise to a sudden and deep inspiration in two or three motions, as in sobbing, followed by prolonged expiration. At times, it may be for an hour or half a day, she hears in her ears a sound comparable to the rapid revolution of a small fan-wheel. Acuteness of hearing normal.

This affection is in all probability choreic. The history is exquisitely that of chorea. Weir Mitchell lays great stress upon climate and season in the etiology of chorea, his observations showing the disease to be more prevalent in spring and in cold climates. Chorea is infinitely more frequent in girls at about this patient's age than in any other class at any other age. Sir Thomas Watson has found chorea to be much more frequent in brunettes than in fairer persons. Whatever the predisposing, the immediate exciting, cause is oftener fright than any other. It is impossible to say, in any given instance, absolutely, that a child has *not* had rheumatism. According to A. Jacobi the disease is sufficiently common in infants, and it is well known that the proneness to cardiac complications does not depend upon the severity of the joint affection. Fugitive pains in the limbs and slight elevation of temperature may then very well be the only obvious indication of a morbid condition which may be accompanied by the deposition of particles of fibrine more or less minute or numerous upon the valves of the left heart, and hence the possibility of embolism. The levator palati is supplied with motor filaments by the facial through the connection of its trunk with the Vidian by the petrosal nerves; the stapedius is also supplied by a filament from the facial. Choreic spasm of muscles supplied by the facial is common enough, but a choreic affection of the muscles of the soft palate has been heretofore unknown.

The only similar case I have been able to find recorded, is that by E. L. Holmes, these ARCHIVES, vol. viii, p. 144. No mention is made of such a disorder by any of the standard works wherein the subject is treated and which are accessible to me, except in Ziemssen it is stated that: "Spasm of the soft palate is almost entirely unknown; even the behavior of the affected muscles in spasms proceeding from the facial nerve, and in those proceeding from the motor filaments of the trifacial, is unknown." Irregular twitchings of some of the palatine muscles are observed in advanced cases of locomotor ataxia, etc. Rhythmic choreic contraction of any muscle continued for so long a time would be an extraordinary circumstance. The contractions of the palate muscles in this case continue with about the same frequency at all times during the patient's waking hours, and do not vary more than four to six in the minute. They do not seem to be influenced by exercise, or having the attention drawn to the matter. The levator palati, though a voluntary muscle, is not in all persons under perfect control of the will, therefore any psychic excitement would be less apt to influence its movements.

The clicking noise is probably occasioned by the vacuum produced at the moment the superior surface of the velum leaves the roof of the naso-pharynx to which it has been applied by the spasm. I had an opportunity of watching the behavior of the velum palati during an attack of acute tonsillitis, and found that though the spasm of the levatores continued without abatement the clicking ceased, and the elevation was not so considerable because of the swelling of the parts, which prevented the complete closure of the posterior nares. When I showed this case at the meeting of the Medical Society, it was stated by some of the gentlemen present that a similar condition existed in the case of a demented woman then in St. Joseph's Hospital. Upon examination of this woman, however, I found that the noise in her mouth is produced by closure of the mouth, placing the tip of the tongue against the lower teeth, and approximating tongue and soft palate, a trick which she had acquired, but which failed her when the mouth was opened; of course any one can do the same.

THE NEW YORK INSTITUTION FOR THE IMPROVED INSTRUCTION OF DEAF-MUTES.

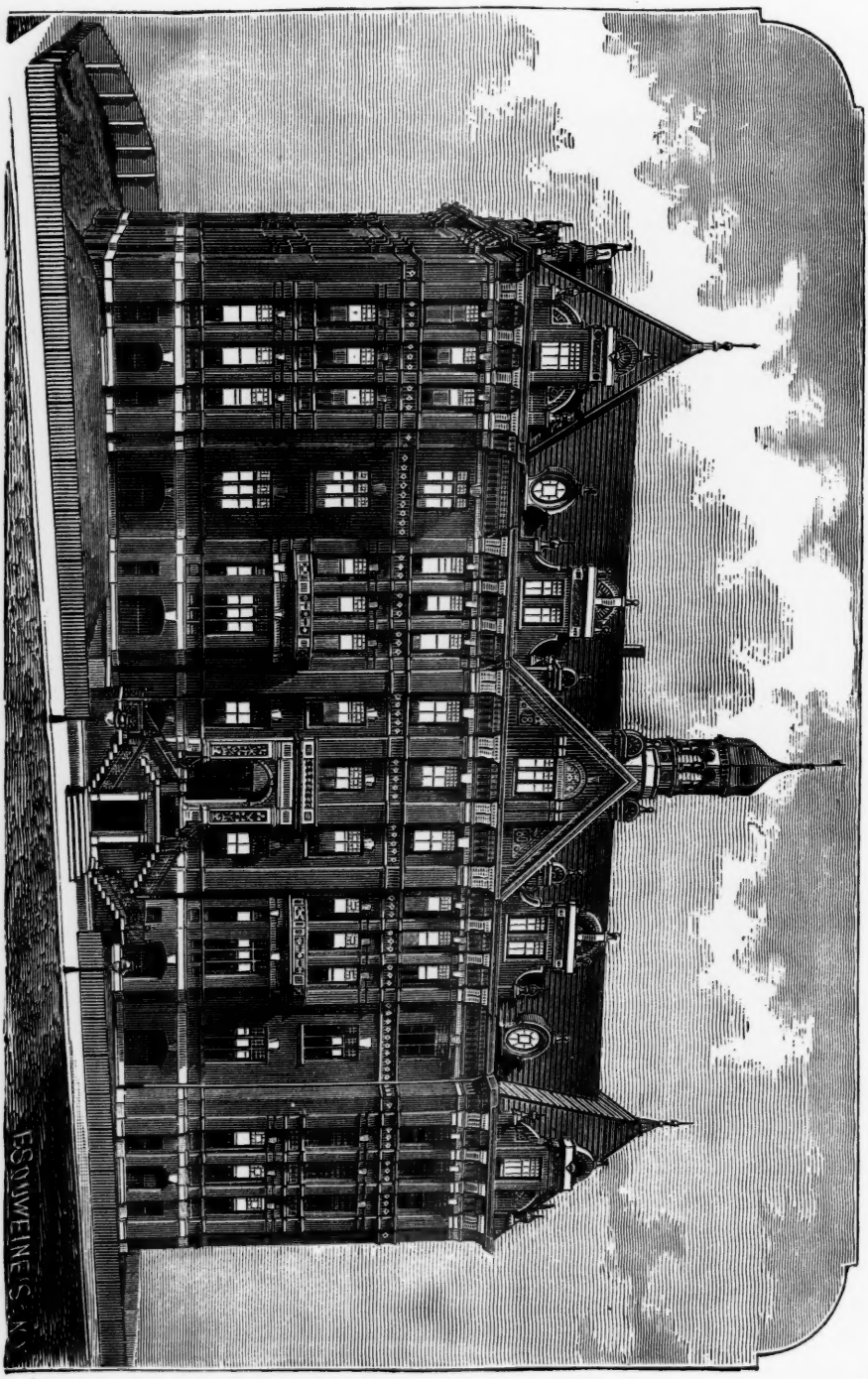
By D. GREENBERGER, Principal.

(With three drawings.)

CONSIDERING that many of our pupils come to us by the advice of those who are engaged in the specialty to which this journal is devoted, it may not be amiss to give, in the following, an account of the workings of this Institution.

The school has been in operation since March 1, 1867. Beginning with a small number of pupils, its sphere of usefulness has gradually extended, and now it is the largest articulation school in the country. Its affairs are managed by a board of trustees, consisting of fifteen members, who are elected by the "Association for the Improved Instruction of Deaf-Mutes." Deaf-mute children, whose parents have been residents of this State for the last three years preceding the application, may be supported at public expense. Pupils from other States are charged for their board and tuition. During the sixteen years of its existence, the Institution has received pupils from almost every State in the Union, and its former graduates are scattered over the land, taking their places in society as useful citizens.

The system of instruction in use at this Institution is what is commonly known as the *oral method.* The pupils learn to speak *orally* and audibly, and to understand what is said to them by observing the movements of the speaker's lips. The language of natural gestures, which every intelligent deaf-mute child invents for himself, and by means of



which he makes himself understood before entering school, forms the medium of communication between the teacher and pupil during the first school year. Afterward all signs and gestures are discarded during the hours of instruction. The questions put by the teacher and the answers given by the pupil are purely and exclusively oral. The manual, or "deaf and dumb" alphabet, is not employed in this Institution.

In explaining, to the readers of this journal, the method of teaching deaf-mutes to speak, it seems hardly necessary to call attention to the fact that the vocal organs of our pupils are commonly in the same normal condition as those of hearing persons. We do not receive children whose loss or want of speech was caused by paralysis of any part of the vocal machinery, nor do we admit those who fail to acquire speech on account of mental imbecility. Our Institution is intended for those only who are of ordinary intelligence and remained mute, or became so, in consequence of congenital or acquired deafness. The name "deaf-mute" is misleading. People who have not given any thought to the matter are apt to believe that the persons to whom that name is applied are afflicted with two distinct infirmities, viz.: deafness and mutism. Hence I have often been told: "You have one advantage, namely, that your pupils cannot disturb you by making a noise." But this is not so. Deaf-mutes can make a noise, and as a rule use their voices a great deal. During an experience extending over a period of more than twenty years, I have never met a deaf-mute who did not use his voice in calling others, or in expressing his feelings, emotions, etc. Of course, the sounds produced are inarticulate. These children do not learn to imitate articulate speech, because they do not hear. But, having the use of their vocal organs, we can teach them to articulate on the following principle: Each of the elements of speech requires its own particular configuration of the mouth and special disposition of the tongue, etc. These various changes of the relative positions of the vocal organs during the formation of speech can be seen by the deaf-mute, and he can learn to imitate them. He can also feel

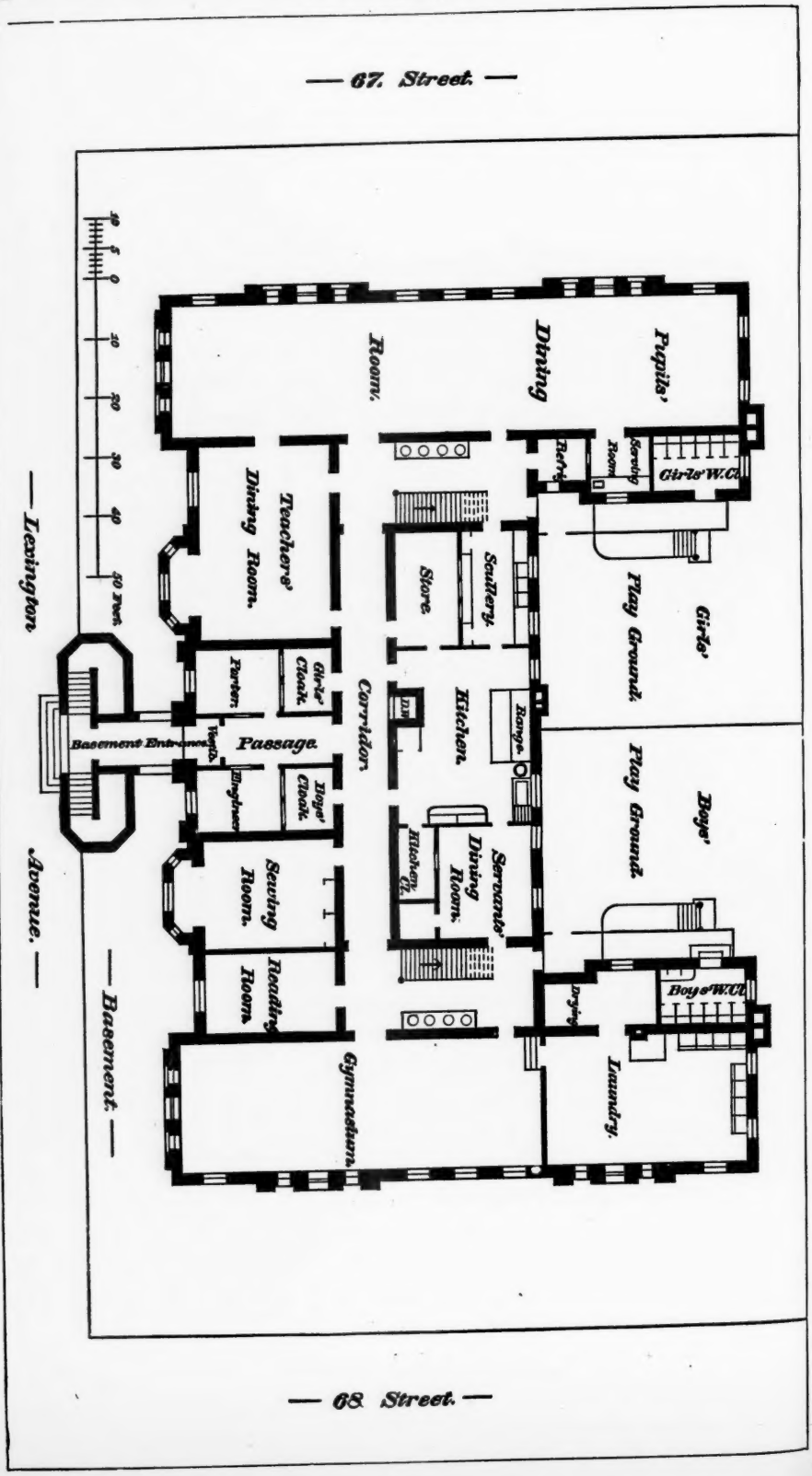
the breath which is emitted from the mouth during speaking, and the vibrations caused in the larynx during the utterance of the vowel sounds and vocalized consonants. The beginning is made with short words of easy pronunciation, as: *bow*, *paw*, *toe*, *papa*, *tie*, *tea*, etc. The mode of procedure is as follows: The pupil stands before the teacher, so as to have a full view of her mouth. She lets him put one of his hands on her throat and hold his other hand before her mouth at a distance of two or three inches, while she slowly and distinctly pronounces the word *paw*, for instance. The child feels, with one hand, the expulsion of breath which is emitted from the teacher's mouth in forming the sound of *p*, and with his other hand, he feels the vibrations caused in her throat by the enunciation of the sound of *aw*. At the same time, he has to watch carefully the motions of her mouth. After the process has been repeated several times, he is required to imitate what he has seen and felt. An intelligent child will succeed in this after a few attempts, though the voice is usually either too high or too low, and has to be regulated accordingly.

The art of lip-reading is acquired incidentally during the instruction in articulation. While watching the movements of the teacher's lips and trying to imitate them, the deaf child learns to distinguish between these various movements. Our pupils read the lips of strangers almost as readily as those of their teachers. They understand what is said to them in a whisper as well as what is spoken in a loud voice, and many who have keen eyesight can read the lips at a distance of sixty or seventy-five feet. To those who can hear, it often seems a matter of great surprise that a deaf person should be able to understand what is said to him by merely observing the movements of the lips. But it must be remembered that whenever there is one sense lacking, some other or others will become more efficient through increased use. Deaf-mutes therefore are very quick to receive impressions through the sense of vision. It is not likely that they see every one of the movements of the tongue, but they see the principal ones and guess the rest. Sometimes it is sufficient for them to read a few

leading words of a sentence and they supply the others. A moustache of ordinary size does not hinder lip-reading, because it partakes of the movements of the lips, but if the latter are entirely hidden by an unusually heavy growth of hair, then labial reading is rendered difficult, and sometimes impossible. Some deaf-mutes learn to read the lips with remarkable facility. A young lady, a former graduate of this Institution, who is totally deaf, goes into society and takes part in a general conversation of a large company, and often strangers do not notice that she cannot hear. During the lessons, the pupils often stand around the teacher, so that some can see the side only of her mouth, yet they understand what she says and follow the lesson.

To teach pupils to speak and read from the lips is not the most difficult part of our task. The instruction in language and the mental development, present far greater difficulties. There are some pupils who acquired a knowledge of language through the ear before they became deaf. But these form a very small minority. The great mass of them have no knowledge whatever of the English language, and can communicate only by means of natural gestures which every deaf-mute child of ordinary intelligence invents for himself to make known his wants to others. The range of this language varies in each individual according to the degree of his intelligence. At best, it is a very inferior mode of conveying thought, and cannot be used as a basis from which we could translate into our language. Besides, the natural order in which these signs are used is different from our conventional arrangement of words in a sentence. For instance, if a deaf-mute beginner were to make the simple statement, "I see a book on the table," he would be very apt to express it thus: "Table book on I see." Thinking in pictures instead of words, he sees in his mind's eye first the table, then the book, and then he thinks of the relation between the two objects and of himself.

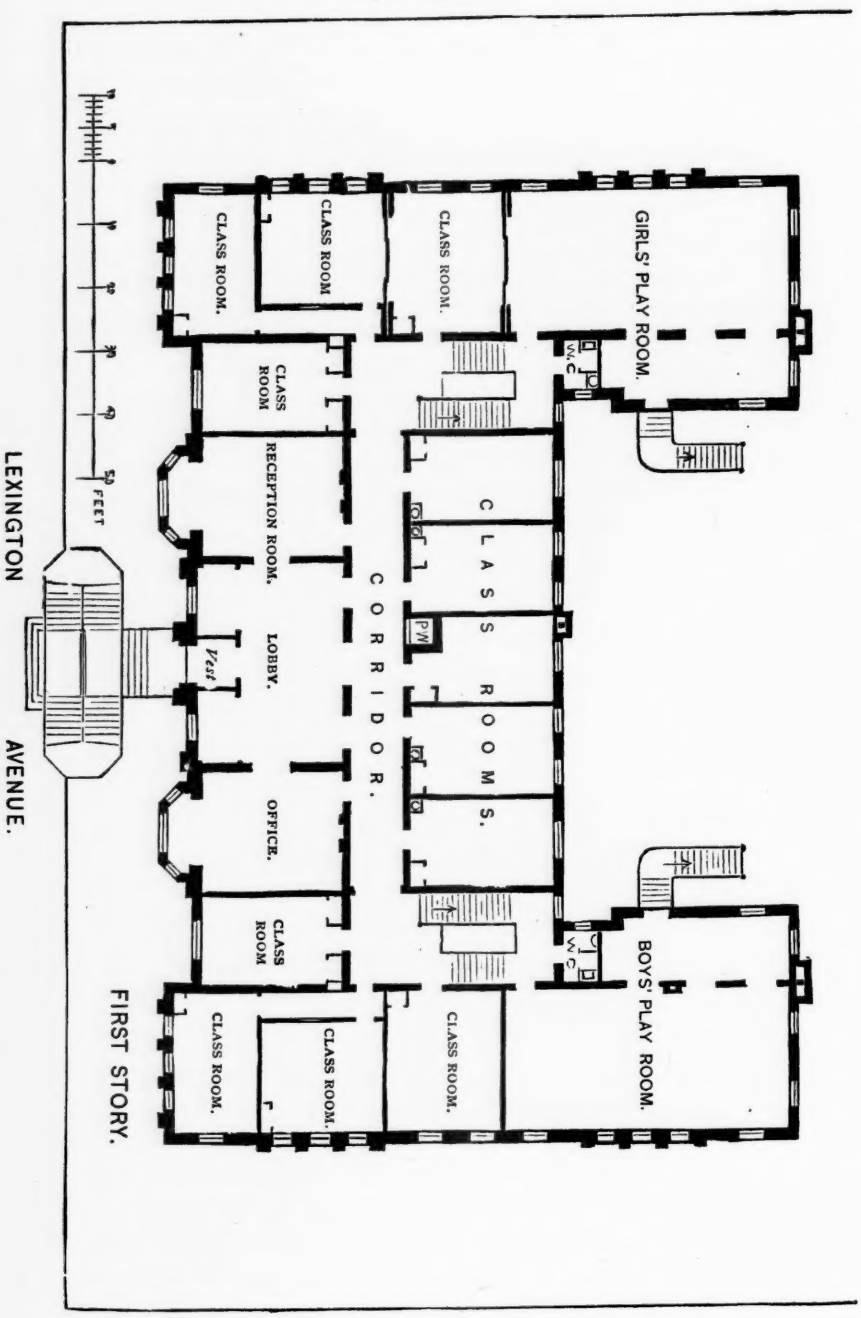
We find that in studying the vernacular of their country, our pupils have all the difficulties that other people encounter in studying a foreign language. Many ingenious and scientific plans have been devised by deaf-mute in-


— 67. Street. —
Pupils' Dining Room.
Girls' Play Ground.
Boys' Play Ground.
Laundry.
Gymnasium.
Reading Room.
Sewing Room.
Servants' Dining Room.
Kitchen.
Range.
Kitchen Cl.
Scullery.
Store.
Corridor.
Passage.
Teachers' Dining Room.
Parlor.
Girls' Cloak.
Boys' Cloak.
Vestib.
Basement Entrance.
Boys' W.C.
Girls' W.C.
Servtg. Room.
Pantry.
— Lexington Avenue. —
— Basement. —
— 68 Street. —

structors to overcome these difficulties. In this Institution we have tried several of these scientific systems and discarded them. For the last three years we have employed the natural method, by which our pupils learn the English language in the same manner as it is acquired by a hearing infant. We call attention to the objects on hand in the school-room, and teach their names; when a child motions to tell the teacher that he wants a drink of water, he is taught how to ask for it in words; when he comes in from a walk and tries to tell what he has seen, he is taught how to express it in words, etc., etc. I have found that since we have employed this natural method, our pupils make more rapid progress in the use of spoken language than they did formerly, when we followed a scientific system based upon the rules of grammar. Everybody knows that it requires years to study a foreign language from books, whereas the children of immigrants coming to this country and mingling with others in the streets, learn to speak English well in a few months. The reason is, that they learn it in a natural way, which is far superior to the most ingenious artificial system that could be devised. The superiority of the natural method of teaching language over all grammatical and scientific systems has also been clearly demonstrated in the case of deaf-mutes.

In addition to acquiring the use of articulate speech and learning to read from the lips, the pupils are instructed in all those branches which are taught to hearing children in the common schools. Our older scholars are quite proficient in arithmetic, geography, history, grammar, natural history, natural philosophy, drawing, etc. In September, 1881, one of our graduates passed a successful examination for admission into the Columbia College School of Mines, and was duly enrolled as a student. The branches in which he was examined were algebra, geometry, French, and German. He is now in the Sophomore class.

The new and beautiful home which was erected for this Institution at a cost of about $150,000, has been completed and in use since the fall of 1881. It occupies the entire front of the block on the westerly side of Lexington Ave-


67th Street.
GIRLS' PLAY ROOM.
W.C.
CLASS ROOM.
CLASS ROOM.
CLASS ROOM
CLASS ROOM.
CLASS ROOMS.
CORRIDOR.
RECEPTION ROOM.
LOBBY.
Vest
OFFICE.
CLASS ROOM
CLASS ROOM.
CLASS ROOM.
CLASS ROOM.
BOYS' PLAY ROOM.
W.C.
50 FEET
LEXINGTON AVENUE.
FIRST STORY.
68th Street.

nue, between 67th and 68th streets. The site and neighborhood are as eligible as any on Manhattan Island. The ground is high and well drained, and Central Park is within a short walking distance. The building itself contains all the appointments that architectural skill, sanitary science, and experience with deaf-mutes could suggest. No expense and no pains have been spared to make this building perfectly well adapted to the wants and requirements of the class of unfortunates it is intended to shelter. The class-rooms are light and airy; the dormitories are roomy and well ventilated; the bath-rooms and lavatories have an ample supply of water; the gymnasium and play-rooms are large and commodious. Proper accommodations for the sick are provided on the top floor of the south wing, and perfectly isolated from the rest of the building, so as to afford the means of quarantining cases of contagious disease in case of necessity. The dining-rooms, the culinary apartments, etc., are fully in keeping with the style and character of the rest of the establishment. The building is lighted by gas and heated by steam. All precautions that human foresight could suggest have been taken against danger by fire.

REVIEWS.

I.

Die Taubstummen und die Taubstummenanstalten nach seinen Untersuchungen in den Instituten des Königreichs Würtemberg und des Grossherzogthums Baden. Von Medicinalrath Dr. Hedinger. Stuttgart: Verlag von Ferdinand Enke, 1882. (The Deaf and Dumb and the Deaf and Dumb Institutions, after his Investigations in the Institutions of the Kingdom of Würtemberg and the Grand Duchy of Baden.)

Reviewed by A. HARTMANN, Berlin.

Translated by D. Greenberger, Principal of the Institution for the Improved Instruction of Deaf-Mutes, New York.

The monograph by Hedinger now before us owes its origin to investigations of pupils of the institutions for deaf-mutes in Würtemberg and Baden. In the first part of the book, which treats of general matters (forty-five pages), we find accounts of the internal arrangements and size of the institutions; then follow short remarks on congenital and acquired deafness, which are based upon individual statistical records. Toynbee's observations are extensively quoted, while more recent and exact investigations are not mentioned. Likewise, in the discussion of the degree of hearing, only deaf-mutes whom Toynbee examined are considered, besides those of the institutions of Würtemberg and Baden. In reference to attempted cures of deaf-mutism, Hedinger lays stress upon the importance of treatment by medical specialists. He does not consider it out of question "that at least in the case of those who are not totally deaf, the power to distinguish vowels, and to appreciate sound in general, may be preserved, if it cannot be improved."

"At any rate the hearing of a large proportion of the cases of acquired deaf-mutism that annually enter the institutions, might have been preserved to a greater or less degree." These views

seem to conflict with the statement made in the introduction, that so far no cure of deaf-mutism has been effected.

In reply to this, the reviewer takes the liberty to remark that in our literature there are a number of cases recorded in which such cures proved successful. Based upon this experience it must be reiterated again that it is desirable that deaf-mutes should be subjected to a professional examination and eventually to proper treatment.

In the chapter on the education of deaf-mutes, the resolutions of the Congress of Deaf-Mute Teachers, at Milan, are published, and the advantages of the oral method especially pointed out. But we must not forget that deaf-mutes who have been educated to use written language only, attain to as high a degree of moral and intellectual development as those who have been taught to articulate. Though they are very much hindered in their intercourse with hearing persons, yet they have the advantage that a considerable portion of time which has to be spent in the training of the voice, can be applied to intellectual development. This is of so much more account, as we find that the articulation of many deaf-mutes is imperfect, and the power of reading the lips leaves a great deal to be desired. Conception of ideas and a knowledge of the vernacular are gained by means of spoken as well as written language.[1]

The branches which are taught in schools for deaf-mutes and the question whether it is best to educate them in institutions or at their homes are discussed in special chapters, and the advantages and disadvantages of boarding- and day-schools are carefully weighed. The author seems to consider boarding-school life the

[1] Here I must interrupt the reviewer for a moment to say, with all due respect and regard, that there is no force whatever in his arguments against the oral method. Of late years the system has been so much improved that, under the charge of a competent teacher, deaf-mutes may acquire the power of speech, and the facility to read the lips during the first four or six months of the course. Henceforward their progress in the various branches of study must be far more rapid than in the case of those who are educated by means of writing and dactylology. For it must be remembered that we can speak a sentence in one ninth part of the time that is required to write it, or in one third of the time required to spell it on the fingers by means of the manual alphabet. In regard to the results it must be admitted that the articulation of some deaf-mutes, who have been educated by the oral system, is imperfect, and that their power to read the lips leaves a good deal to be desired. But even an imperfect articulation, proves of incalculable value in the intercourse with hearing and speaking people, few of whom understand the sign language; even the least successful scholars learn to speak intelligibly enough to be readily understood by their parents and friends, who soon become accustomed to their peculiar enunciation; and the number of those who learn to speak and read the lips so well that they can easily communicate with strangers is increasing from year to year.—The Translator.

most appropriate for the first half of the number of years of school time, and day-schools for the other half.

The second part of the monograph consists mostly of tables showing the results of examination of 415 deaf-mutes. Of this number, 181 were cases of congenital, and 234 of acquired, deafness. The first table shows the names, ages, causes of deafness, condition of the drumhead and of the nose and mouth, examination of the hearing, and special remarks. In the second and third tables statistics of congenital and acquired deaf-mutism are given separately. Then follow two combining tables, and table VI is a summary of the whole statistics.

It is to be regretted that the examination into the causes of deafness, which is of paramount importance, is the weakest point of Hedinger's investigations. He seems to have relied entirely upon institution reports. The reviewer inclines to this view, because he thinks that if the author himself had gathered the statistics, or if he had delegated somebody else to do it, we would not find the following among the causes of deafness, viz.: "in consequence of vaccination, convulsions, sleeplessness during the first year, teething, sickness," etc.

The reviewer frequently found during his own examinations, how deficient the records of deaf-mute institutions are in regard to the origin of the loss of hearing, and therefore called attention to the fact that special statistics of deaf-mutes have no value unless the investigations are made by means of exact lists of questions. Hedinger, too, acknowledges this, although he does not act accordingly, for he says that we must be very careful in drawing certain inferences from statistics, and that above all close examination, full lists of questions, and less regard to personal statements are necessary, lest we should fall into the same errors and meet with the same reproaches that other disciplines, especially political economy, justly incur.

Careful readers will receive with reserve the statements about the influence of diseases of the nose and pharynx upon deaf-mutism. Hedinger found affections of the pharynx in 157 and affections of the nose in 112 of all deaf-mutes. In the opinion of the reviewer it does not seem judicious to draw any conclusion from this as to whether these affections are to be considered causes of deaf-mutism. Hedinger's tables themselves show that a large percentage of those who lost their hearing through cerebro-spinal meningitis and diseases of the brain are suffering with affections

of the nose and pharynx, in which case such affections cannot be considered of etiologic moment. Likewise, we know that even among persons of normal hearing the percentage of diseased condition of the nose and pharynx is quite considerable. Therefore, if we find the same condition as frequently among deaf-mutes, we must not infer that these diseases are to be considered causes of deafness. Equally cautious we have to be in utilizing the otoscopic results, because we know that even among persons of normal hearing we very frequently find deviations from the normal.

If the author believes that his investigations are the first otologic examinations of deaf-mutes, we take the liberty to call his attention to the researches of Victor Bremer, de Rossi, Roosa, and Beard.

Apart from the criticisms which we considered our duty to express in reviewing the monograph before us, we feel constrained to express our high esteem for the author on account of the industry and perseverance which were required to undertake such extensive investigations and to complete them.

II.

Lehrbuch der Ohrenheilkunde für practische Aerzte und Studirende. (Text-Book of Otology, for Practitioners and Students.) By Prof. Adam Politzer. In two volumes. Vol. II. With 152 wood-engravings. Stuttgart: Ferdinand Enke, 1882.[1]

Reviewed by A. HARTMANN, Berlin.

The first volume of Politzer's text-book having found general recognition, the appearance of the second was looked forward to with interest. Now that this volume lies before us in imposing proportions after an interval of four years, we are not surprised that the most thorough and careful preparation of this volume has consumed so great a length of time. Politzer's work, now completed, is so excellent in its execution that we do not hesitate to pronounce it the best and most complete hitherto written on otology. The anatomy and physiology of the ear as well as its pathology and treatment have been handled in an

[1] Excellently well translated into English by J. P. Cassels, M.D., of Glasgow. One volume of 800 octavo pages. London: Baillière, Tindall, & Cox. Philadelphia: H. C. Lea's Son & Co., 1882.—ED.

equally thorough manner, and herein the previous meritorious personal labors of the author have been particularly utilized. Special mention should also be made of the numerously interspersed patho-anatomical observations and illustrations which alone secure a high value to the book.

Although most of our readers presumably own a copy of Politzer's text-book, it might not be inappropriate to briefly summarize its contents and to point out some details which suggested themselves to the reviewer on its perusal.

The present volume begins with the description of the adhesive processes in the middle ear. Politzer points out that in these, with far greater frequency than in all other forms of inflammation of the middle ear, symptoms occur which indicate a simultaneous affection of the labyrinth, especially in the insidious form of the disease ending in synostosis of the stapes. In these cases, clinical observation forces us to the assumption "that the disease of the two portions of the ear—the middle ear and the labyrinth—is produced simultaneously by identical trophic disturbances." For the explanation of the continuous noises Politzer refers to the increased pressure in the labyrinth which starts from the drum cavity, in addition to the affection of the expansion of the acoustic nerve. In the adhesive processes Politzer's treatment is confined in the main to the air douche and injections of a solution of sodium bicarbonate. Politzer regrets that it has hitherto been impossible to keep an artificial opening in the drum permanently patulous, and believes that the solution of this problem will signalize a great advance in the therapeutics of affections of the ear. As novel should be mentioned the division of the anterior malleolar ligament which Politzer has repeatedly performed in case the manubrium is much retracted, when only temporary improvement occurs after the air douche. About the results of tenotomy of the tensor tympani Politzer does not express a very favorable opinion. In several patients who came to him some months after tenotomy had been performed upon them, complete deafness had ensued in the operated ear. A mobilization of the plate of the stapes as recommended by Kessel, Politzer thinks to be impossible of execution according to his experiments.

The adhesive processes are followed by acute purulent inflammation of the middle ear, which Politzer—perhaps not quite justly—separates from the acute otitis media, running its course

without perforation of the membrana tympani. Both affections, surely, differ only in degree and in the frequently merely accidental occurrence of perforation. In intractable acute suppurations of the middle ear Politzer recommends as excellent treatment injections of warm water through the catheter into the middle ear when the pains persist even after perforation of the drumhead, also in those stubborn forms in which the perforation is situated on a warty elevation of the membrana tympani, and in painful inflammations of the mastoid process.

Under the head of chronic purulent otitis media, the appearances of the membrana tympani are illustrated by a very large number of excellent wood-cuts; the perforation of Shrapnell's membrane and the vertical sections appear to us especially worthy of mention. The accompanying description of all the conditions which are liable to occur in chronic suppuration of the middle ear is exceedingly complete and instructive. Besides the usual occurrences, we find a long series of hitherto little noticed and rare observations, which render the whole chapter one of particular value. For the removal of inspissated masses from the depth of the auditory canal Politzer employs a rubber tubule, 4 *mm.* in thickness and rounded at the extremity, which is slipped over the point of the syringe and inserted to the depth of 2 *cm.* into the external auditory meatus. For cleansing the recesses of the middle ear Politzer uses a canula of hard rubber instead of German silver. The carious processes in the temporal bone developing in the course of suppurations of the middle ear, otitic meningitis, and cerebral abscess, are likewise illustrated by a large number of personal observations and drawings, and are very minutely discussed. In inflammations of the mastoid process, accompanied by violent pain, Politzer had very good effects from Leiter's cooling apparatus; besides, Politzer places a great value on irrigation of the drum cavity through the tube. He thus cured numerous cases in which others thought operative opening of the mastoid process indicated. The diseases of the mastoid process and its artificial opening are likewise illustrated by a large number of wood-cuts.

In his division of the subject, which differs from the ordinary, the description of suppuration of the middle ear is followed by that of the affections of the external ear, which are succeeded by the new formations, otalgia, and the neuroses of the muscles.

The affections of the labyrinth, of the acoustic nerve, and of its

central portion are preceded by an introduction, in which the difficulties of a satisfactory treatment of this chapter are pointed out, inasmuch as the number of exact post-mortem researches with accurate observations during life is still very small. In the same way the results of our methods of testing the hearing are as yet rather unsatisfactory for the exact diagnosis.

Ménière's disease is discussed very fully. In Voltolini's inflammation of the labyrinth the deafness can be caused either by a simultaneous purulent inflammation of the labyrinth propagated from the skull cavity, or by an affection of the trunk or the root of the acoustic nerve. Although Politzer himself had occasion in one case to make an exact post-mortem, he still believes that this form of inflammation can secure the right of being recognized as an independent form of disease only after repeated post-mortem verifications.

All the diseases affecting the nervous apparatus are treated with care and with equal completeness, as well as the affections of the sound-conducting apparatus ; and here we find also a series of the most interesting observations recorded. Three smaller chapters form the conclusion of the book : the malformations of the organ of hearing, deaf-mutism, and the acoustic instruments for people with impaired hearing.